A Database Publication

THE MICRO USER

Volume 8 Number 4 June 1990 £1.50

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How to start your own free program library

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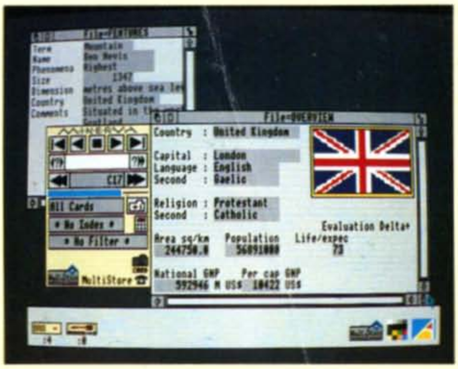

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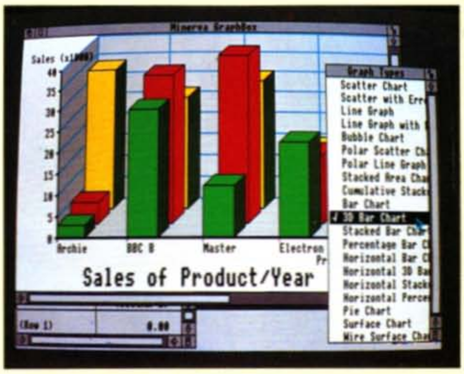
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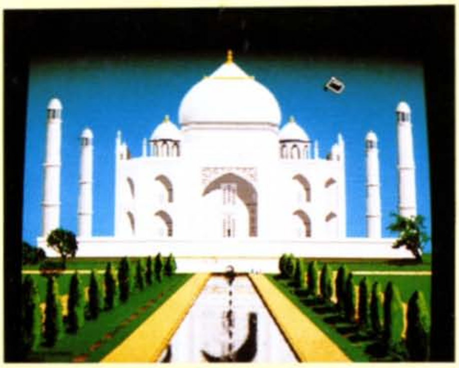

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Cover story

Design and build a vertical or horizontal sundial that's exactly right for you. An ideal project for schools and in the home. ***Turn to Page 36***

Newcomers ON TEST

Colour Box

61 Reel Time
We check out audio tuition tapes designed to help you learn Risc OS and Acorn DTP.

64 Illustrator + Colour Box
Two art programs for the BBC Micro that combine to produce extra graphic power.

67 Hand Scanners
Grab pictures into your 32 or 8 bit micro with this new, easy-to-use hardware product.

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

Get it right ✓

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue.

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of The Micro User. Turn to Page 106 to find just what you're looking for – from cheap modems to complete computer systems.

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Learn how to program the database manager in the concluding part of our type-in utility.

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100 Slides
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Art for Art's Sake

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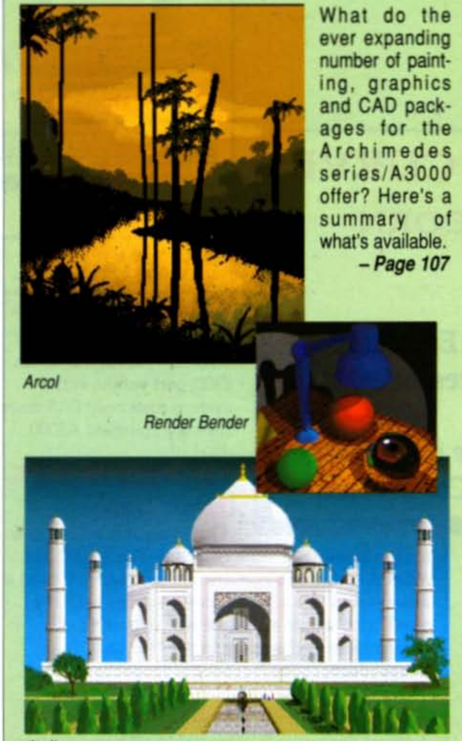

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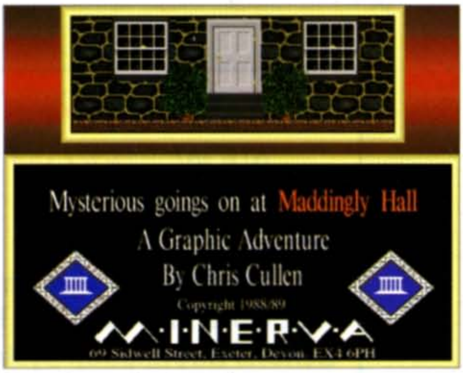
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A Graphic Adventure
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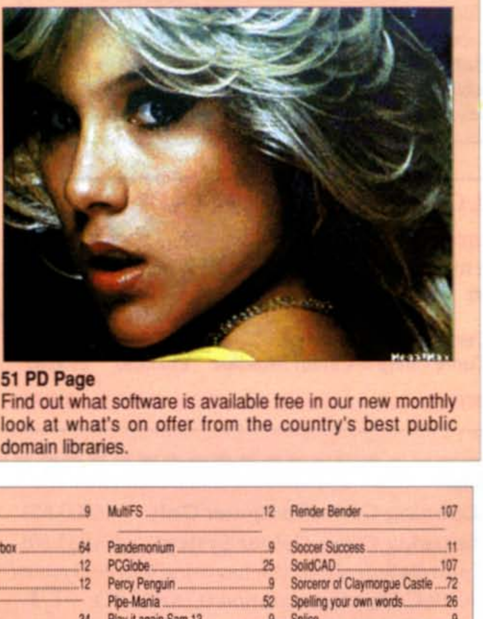
New Series



51 PD Page
Find out what software is available free in our new monthly look at what's on offer from the country's best public domain libraries.

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For the price of just one year's subscription you get 15 months of *The Micro User* plus the disc or tape for each issue. In addition you will get the disc from the month you take out your subscription. Or take out the incredible 31 month deal for even greater savings.
– See Page 62

THE MICRO USER
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What you'll find on this month's disc or tape:

- Pipe-Mania – fully playable demo of this great game.
- All the listings from this issue.
- Hac Man's index: Text file for the third year.
- A compactor and decompactor for the courses of Golf!
- A full, compacted course for Golf!

Especially for the Archimedes series and A3000 only:

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THE MICRO USER

Games galore

In our special Games issue NEXT MONTH we pack in features on games writing, a unique 16 colour hardware scrolled screen, plus four great games. Not forgetting all our regulars and the money saving PD page.

New
from
Acorn

THE LEARNING CURVE

THE LEARNING CURVE
NEW - FROM ACORN

It consists of:

An A3000 Computer
The new Digital Research PC Emulator
First Word Plus v2 Word Processor
Genesis Information System
A Video explaining how to use the package
Information on the National Curriculum

Save Over £185

The free software bundled with this package is worth £300, and yet the entire system costs only £115 more than the standard A3000.

Ideal For Home & Education

This system is tailor-made for the home user with children. The A3000 and other Archimedes systems are increasingly used in schools and this all-inclusive package with the excellent Genesis software will supplement Information Technology in the National Curriculum.

Just Right for Home & Business

A Word Processor is essential in all home systems, and 1st Word Plus with its built-in spelling checker is excellent. The new PC Emulator also means that over 95% of PC software (DBase, Lotus, Wordstar etc.) will run on the A3000 straight away.

RISC User

RISC User is the world's largest Archimedes Support Group, and publishes the leading magazine devoted exclusively to the A3000 and Archimedes. An annual subscription is £16.90 (UK) and carries a multitude of benefits, including FREE technical support and discounts.

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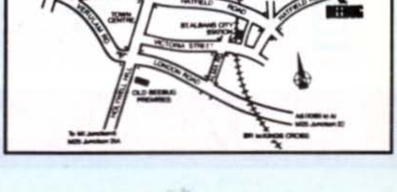

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News BEAT

Buying boom goes on, says Acorn

THERE is no sign of the home computer spending boom ending according to Acorn Computers. A consumer poll has shown that despite high interest rates and rising mortgage costs, families with children are spending just as much as they did last year.

These findings further boost Acorn's latest A3000 promotion, The Learning Curve, news of which was broken in *The Micro User* last month.

During February this year, 27 per cent of people with children were expecting to make a single purchase to the value of £1,000 – the same figure as in July last year. Only 15 per cent of households without children plan the same level of spending, compared with 17 per cent last July. The research was carried out by MaS Ltd.

"These results are very encouraging", said Simon Lovesey, home market manager for Acorn. "We believe that more parents will be spending this money on home micros to support their children's education while also investing in a long term family asset".

Billed as a complete learning package for the whole family, The Learning Curve bundles an A3000 with creative learning software Genesis, word processor First Word Plus, PC Emulator, books and an introductory video for £804 excluding monitor.

"The Learning Curve has enormous potential in the home and school markets and has already captured the imagination of dealers, retailers, local education authorities and schools", added Lovesey.

More art for the Arcs

ARCHIMEDES 400 and A3000 owners who want to add a more professional appearence to their desktop publishing, graphics and design work are the main target for MicroEye A1, the new full colour image digitiser from Digihurst (0763 242955).

The package includes utility software which allows images to be transferred to memory, disc or to other Archimedes applications.

The image can be scaled and clipped as needed and software controls are included for saturation, contrast and brightness of that image.

MicroEye A1 captures colour images into Archimedes ram at 640 x 256 pixels resolution with 24 bits of colour information per pixel. The full data is available to image processing applications but in sprite form, the images are reduced to 12 bits per pixel giving an effective palette of 4096 colours.

In sprite form, the images are easily transferred between other Archimedes applications, for example to DTP programs and art packages allowing their output to HP Paintjet and other colour or mono printers.Software includes a library of Risc OS routines allowing users to incorporate image capture into their own applications and process digitised image data. For the Archimedes 400 series, MicroEye A1 is supplied as a plug-in board with a back panel which carries an input connector for RGB and video.

For the 3000 series, the board is supplied mounted in a separate external box which plugs into the expansion connector on the back of the computer. Both need at least 2Mb of main ram. Price, £569.

Database helping doctors

TEAMED with infra-red cameras and an image processing package, Archimedes computers are helping to diagnose the severity of burns then guide treatment at Glasgow Royal Infirmary.

When the burns unit receives badly injured patients, the immediate problem is to establish the extent and depth of serious burns – a critical factor in the way they are treated.

In the past, treatment has been based solely on the doctor's experience and judgement. Now the Archimedes 440 has been called in to build up a database which assists in clinical decisions.

The new system was devised in the biochemical unit at the University of Strathclyde under the direction of Dr. A. C. Fisher.

"By using image processing techniques to capture images of burn tissue areas, measure and classify them, we are able to build up a database that will assist in the objective assessment of injuries which is likely to be more precise than in the past", he said.

"Infra red is the only way to measure accurately and rapidly but signal to noise ratios are poor. Using this system, we can enhance images to aid interpretation. We see image processing as a vital tool in our research".

Down to Basics

A NEW disc-based tuition course on Elementary Basic for owners of BBC Micros and Archimedes machines is being offered by Universal Computer Support (0922 30038).

On 80 track ADFS, the first part of the course includes 16 lessons and 46 example programs. An Info program is also included to guide users around the discs. The whole course costs £20.95 but lessons one to eight can be bought for £10.95 or just the first four lessons cost £5.95. They are available on both 5.25in and 3.5in discs.

RISC USER

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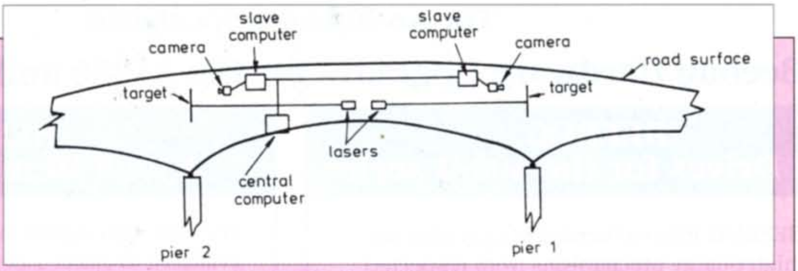
Micros are making big bridges safer



Layout of equipment to measure deflection of the Foyle bridge main span

FOUR BBC Micros are playing an important part in ensuring the future safety of wide span bridges. Built into the box girder structure of the giant Foyle Bridge near Londonderry, they help monitor movements caused by storm conditions and heavy traffic.

The long-term survey is being carried out by the Department of Civil Engineering at Queens University, Belfast working for the Department of the Environment in Northern Ireland.

Findings from the survey will show just how realistic present codes of civil engineering practice are and data will eventually be incorporated into new safety codes. Opened in May, 1984 the bridge spans the river Foyle and is heavily used by traffic passing between Northern and Southern Ireland. Its 450 metre span are supported by two pillars.

Built into the structure 30 metres above the water, the four specially adapted BBC Micros are linked to lasers and solid state cameras to plot movements.

Positioned at the centre of the span, the lasers point at screens fixed to the supports and solid state cameras plot the track of the light beams as the bridge moves.

The cameras are controlled by standard BBC Micros connected through the parallel ports. Software to work the cameras is stored in an eprom chip which replaces Basic.

Having the program in firmware means that no monitor or disc drive is needed, and if power is interrupted the program resumes its work automatically.

The micros then send their information to a central minicomputer.

With two lasers pointing in opposite directions, vertical movement and the angle of movement can be computed. Typical results show that four lorries weighing 100 tonnes force the centre of the bridge down by 220mm. Storm conditions have created wind-induced movement of 110mm.

"We are looking at cyclic stresses in the steel and this must be done on a long term basis", said the head of the project, Dr.David Sloan.

"Once you have enough data, you can predict metal fatigue. Normally a bridge is built for a life of 120 years, but in practice levels of stress make significant changes to its life.

"For example, the Severn Bridge is now undergoing repairs only 20 years after it was built".

New tool for film makers

SPLICE is a new editing program for the Archimedes claimed to apply cutting room skills to animated graphics sequences.

Developed by Ace Computing (0223 462212), it uses output from the company's Mogul film-making software and can also generate its own film from sprites created in an art package.

Users can delete or insert frames, join sequences, import a frame into an art package, shrink, enlarge or change the shape of film, run film backwards and create cartoons by amending a scene frame by frame.

Price, £30.

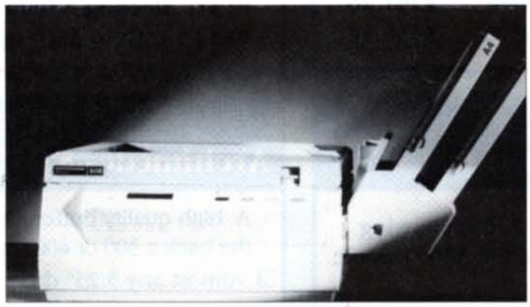
The world on a disc

A GRAPHICS library pack featuring maps of the world has been launched for the Archimedes by Micro Studio (0353 720433).

It incorporates more than 100 maps in outline form. Countries included are Austria, Belgium, Greece, Iceland, New Zealand, Peru, Russia and Yugoslavia.

Major cities are marked by a dot and rivers and lakes are shaded blue.

The two disc pack costs £29.95.



Mannesman Tally's new fast laser printer

Bat 'n' ball with a difference

A NEW game for the BBC Micro written by a completely new programmer features in the line-up for the latest Play It Again Sam compilation from Superior Software (0652 58585).

Hyperball took 19-year-old Stephen Parkinson two years to write and he is the first to admit that he learned as he went along. After starting his programming career on the Electron, he has now graduated to the BBC Micro and is well on the way to producing his second game.

Hyperball is played on six levels with 120 screens. Special features include infra red scanners, eight ball splitters, aliens, cannons, weapon purchase, bonus rounds and screen jump options. "This is a completely new game and is so good that we considered making it a full-price release", said Superior boss Steve Hanson.

"The only reason we have not put it out at full price is that there have been similar ones before like Arcanoids. ".

Also in Sam 13 are the Top Ten game Pandemonium, star game Barbarian II and that old Superior favourite Percy Penguin.

Price, £9.95 for cassette, £11.95 for 5.25in disc and £14.95 for Master Compact 3.5in discs.

MT going for speed

MANNESMANN Tally (0734 788711) has launched a new six page a minute, dual bin laser printer which it claims is capable of out-performing many industry standard machines based on higher engine rates of 8ppm or even 10ppm. These claims for the MT906 are based on independent benchmark tests carried out by PC Labs in the United States.

The machine incorporates Mannesmann Tally's own high-speed Jade controller designed to maximise throughput. It is based around the National Semiconductor NS32CG16 processor and an MT application specific integrated circuit.

A dual bin version starts at £1,690 and a single bin at £1,490. Both come with 512Kb standard memory, parallel centronics and serial RS232 interfaces and HP LaserJet Series II emulation.

Optional extras include a paper jogger for £175, IBM/Epson emulation for £150, face-up tray for £25, smart cards from £175, 1Mb extra memory for £295, 2Mb for £525 and 4Mb for £995.

Mannesmann Tally recently announced good year end results. Coinciding with its 21st birthday in the UK, unit shipments increased by 43 per cent while revenue grew by 24 per cent to £44.5 million.

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An exciting new release for the A3000 allowing the connection of 5.25" drives to the A3000. Some of the features include:

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☐ Full 12 months warranty

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0102	**DFS reader**	**£ 9.06**

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A fast, convenient method of transferring data between the BBC Micro/Master and the Arch. A3000 users will require the A3000 serial chips.

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All prices exclude VAT. Please add £3 for P&P (£7 for hard drives). Prices and products subject to change without notice.

All these BEEBUG products (except hard drives) are available from your local KELATOR dealer.

Hercules flexes his muscles

ONE of the co-founders of Acorn Computers and the man behind the BBC Micro, Dr. Hermann Hauser has signed a deal with Acorn to boost his latest project – the book computer.

Through his new firm, The Active Book Company, Dr. Hauser is developing an A4 sized portable with superb power. It will feature word processor, spreadsheet, database, diary and a built-in fax service – but will not have a keyboard. The user will simply point and write.

Dr. Hauser's deal with Acorn gives him access to the company's technology which covers development tools as well as hardware and software.

To make the new machine the Active Book Company is exploiting the latest super-integration techniques to produce a multi-function chip called Hercules. Under the agreement, Hercules will incorporate features of Acorn's successful ARM chip.

Dr. Hauser predicts that his new machine will be available within 12 months. It has been heralded as the most radical breakthrough in personal computers since the Apple Macintosh.

The right line

IN a recent edition of *The Micro User*, the AdventureSoft telephone number was wrongly given. The correct number is 021 352 0847.

The Swift 24...one of Citizen's printers now compatible with the Archimedes range

New colour driver

CITIZEN Europe (0895 72621) has announced what it claims to be the first nine and 24 pin colour printer driver to ensure complete compatability between Archimedes computers and Citizen colour printers.

Available on disc, the colour driver allows colour printing using any Citizen colour dot matrix printer including the Swift 24 and the ProDot 9, 9X and 24 models. The driver costs £10.

Acorn launches graphics packages for Risc machines

ACORN has announced two new graphics packages for its range of Risc machines and workstations. Fam links computer-aided design and finite element analysis and Gino is a powerful Fortran graphics subroutine library.

FAM provides powerful finite element modelling pre- and post-processing. It enables design revisions to be quickly made and its command/menu language supports both novice and expert users.

The two Fam packages currently available are FAMbuild for modelling and analysis and FAMresult for display and graphical presentation of results. They come from Cambridge-based FEGS.

Implemented to run under Risc OS, Gino takes full advantage of high resolution colour graphics screen modes. It includes three modules.

z Gino-F 3D is a library of over 200 user-callable Fortran subroutines including basic line and arc drawing, characters and symbols, colour, line styles, full 3D transformations, windowing, projections and viewing.GinoGraf provides advanced facilities for producing graphs, histograms and pie charts. GinoSurf displays 3D data as contour maps or surface views with full hidden line removal. It comes from Warwickshire-based Intelligent Interfaces. Gino will run on Archimedes or R140 Unix workstations under Risc OS while Fam is a Unix package which runs on R140 computers under Risc iX, Acorn's implementation of Berkeley 4.3 Unix with system V extensions.

Gino costs £375 for educational buyers, GinoGraf and GinoSurf cost £175 each. The prices double for non-educational users.The price of Fam had not yet been fixed. FEGS can be contacted on 0223 237111

Opening for managers

CRUMBSOFT (0736 67572) has re-launched its game Soccer Success, a multi-player football management simulation for the BBC Master. Sixteen teams are featured and up to eight players can take part as football managers.

The aim is to win both the league and Challenge Cup and finish top of the first division. Price £14.95.

Share a printer

ALERT Technology (0270 585500) has launched the Data Magnet Auto Printer Sharer, a unit which allows four BBC Micros to use the same printer. The package is processor controlled with a fully automatic operation.The price of £84 includes its own power supply.

The next best thing to an A3000 – well almost ...

GRAPHIC artist, cartoonist and *Micro User* games writer Mike Goldberg has achieved the ultimate in the micro world – a custom-built BBC A3000.

In common with specially-built cars, hand-tooled shoes and the other trappings of the super wealthy, it's all a question of money, but there's a difference: Mike's one-off machine results from a lack of the readies – not an excess.

The gold, silver and precious stones which this idea conjures up have been replaced by cardboard boxes from the supermarket, used toothpaste tubes, guitar strings and papièr maché.

As the proud owner of an original BBC model A, Mike has ambitions to own an A3000 but not enough cash to buy one, so he's decided to make his own.

It won't have any working innards but it will look the part in the Goldberg's Lincolnshire home.

"My wife Lea and I are both artists, so when we can't afford something, we make it", he said. "Because I couldn't have an A3000 which actually worked I decided the next best thing was to make a stand-in. By the time I've used part of an old keyboard and made a monitor with a colour picture on it my A3000 should look good".

Among Mike's highly original games published in *The Micro User* are Five Alive, Dickie Brickie and coming soon Blue Meanie

Inspiration on its way

LATEST news on the !Inspiration Midi sequencer for Archimedes and A3000 machines was that it had two weeks to go before its release by Pandora Technology (01-221 9653).

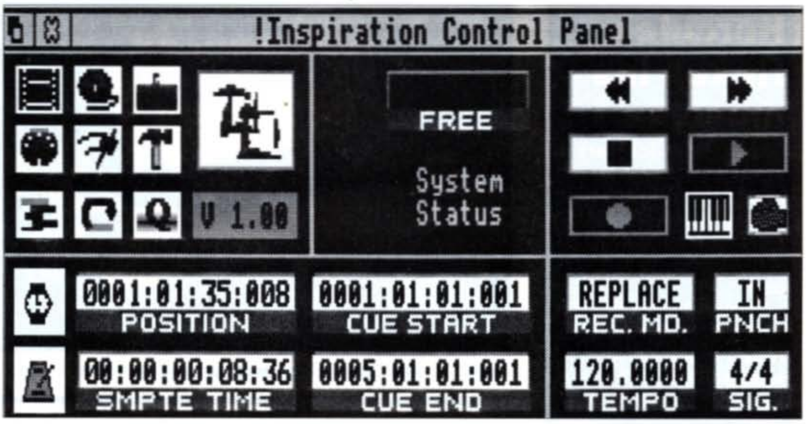
Leading dealer in the Archimedes music field Ampsound (0727 50075) was expecting to get it on sale imminently.

Users of !Inspiration need a machine fitted with Risc OS and a Midi interface. Based on the principle that Archimedes machines are ideal for music, it uses the superior graphics capabilities of Risc OS to the maximum. Mass storage is taken care of by both ST506 and SCSI device interfaces. Price has been stated as £458.

Archimedes owners have had to wait for !Inspiration because of the weight of work Pandora faced in its development.

"We have been developing the program in a new environment and there have been some hiccups along the way", said Philip Brown of Pandora.

"Sixty per cent of the work has concerned how !Inspiration sits in Risc Os which is an extra to take on over and above the actual development. We are now fine-tuning it and are very close to completion".



Capture Arc colour

DESIGNED to capture full-colour images directly into Archimedes programs, Hawk V9 is the new real-time colour video digitiser from Wild Vision (091-281 8481).

The expansion card obtains high quality colour sprites from video sources for use in Risc OS applications. They can be used in a real-time colour video display in a desktop window or can be dragged into other applications.

With the Hawk V9 comes a wimp-driven application program FastGrab which provides full control of the digitiser and allows images to be clearly displayed in 256 colour modes. Hawk V9 accepts any composite PAL video input signal from a camera or video recorder. Price, £389.

Hawk V9
Colour Digitiser

Making a good impression

FANS of London-based folk group *Childe Rolande* can sing along to its first professional music tape thanks to an Archimedes 310, Computer Concepts DTP package Impression and the skill of Micro User reviewer Bruce Goatly.

When he received Impression to review it for *The Micro User*, Bruce used the package to lay out the lyrics for the cassette inlay card printed three times proper size on a laser printer then photo-reduced to provide nearly 1000 dpi resolution.

His involvement came through his wife Alice Thacker who sings with the five-member group which specialises in medieval folk songs using such instruments as mandolin, dulcimer, bodhran, hurdy gurdy and crumhorn – but they're not averse to including electric instruments too, resulting in a sound reminiscent of Pentangle, Steeleye Span and Clannad.

"The group have been around for many years", said Bruce. "Called Long Last, this is their first tape and I wanted the inlay to look really good.The music took two years to prepare and is selling well – using my Archimedes 310 with Impression added the final touch".

Childe Rolande..they're singing along with an Archimedes 310

Now it's big Brother

A RECENT report from market research company Romtec shows that printer manufacturer Brother now commands more than 12 per cent of the UK laser printer market – second only to Hewlett Packard. This coincided with record sales figures for Brother in January.

Expanding frontiers

A NEW dual user port expansion card from Science Frontiers (0224 642765) adds two eight bit bidirectional ports and two hardware timers to Archimedes 300 and 400 machines.

Compatible with BBC Micros, the ports can be used to control a variety of external devices in exactly the same way as with the BBC Micro. They are simple to use from Basic, C and ARM code using stndard operating system calls. Control routines are supplied in rom and interrupts are supported. Price, £97.70.

Arxe starts with a trio

NEWLY-formed Arxe Systems (01-534 1198) has launched its software range for the Archimedes with three products.

MultiFS is a multiple format filing system support which provides access via a standard Risc OS filing system and the multitasking Filer to MSdos, Atari and BBC Micro DFS format floppy discs. It also extends this access to any PC emulator winchester partitions. Price, £35.

Designed as a software developers' aid, ArmSim is an Arm 2/3 simulator which allows Arm code to be single-stepped within the host environment. Trace and termination conditions can be defined as well as the processor state. ArmSim is due out soon, price to be fixed. CBreeze is the C programmers' editor which has previously been available for the Atari ST. It includes a find function, find function references and next function with standard generic text editor features

Key bindings are customisable and other features are conditional editing, function folding and filing system access to editor buffers.

For all BBC Model B and Master users

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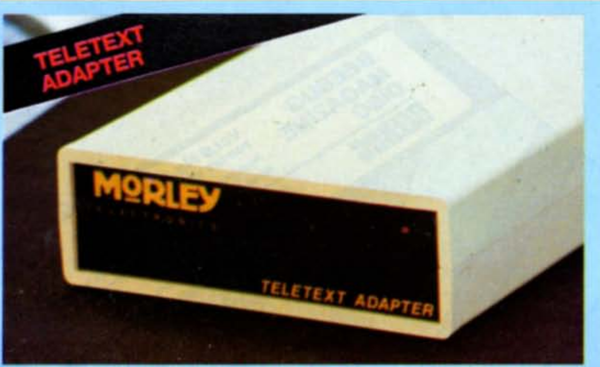

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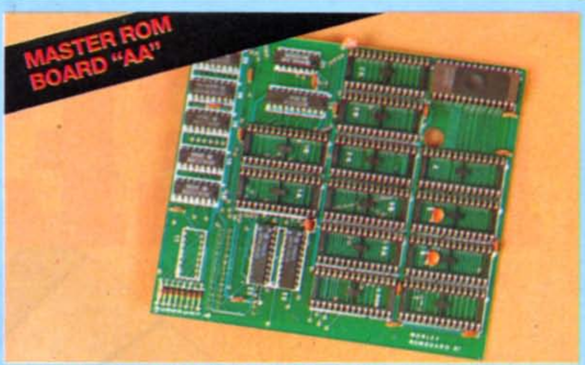

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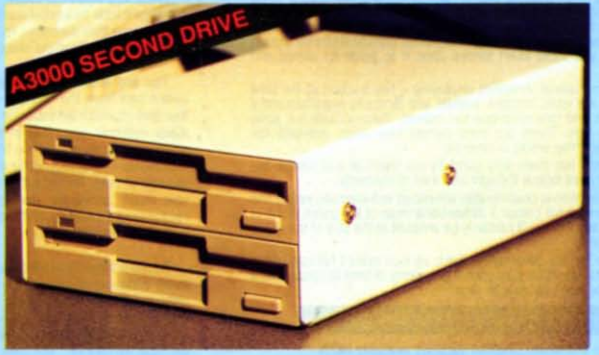

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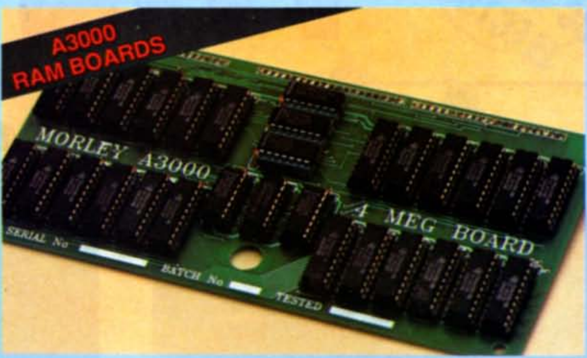

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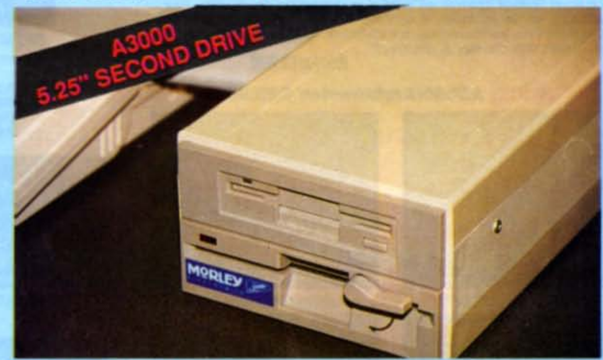

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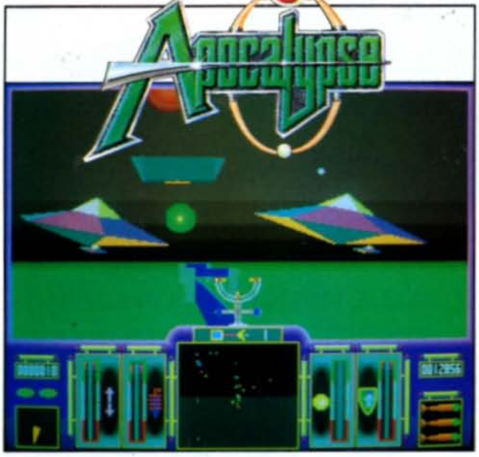

APOCALYPSE

Apocalypse is designed purely for the Archimedes. Utilising the machine's colossal processing power combined with ingenious programming techniques, the author has created a masterpiece which could not have been produced on any other home computer. The author is of course Gordon Key who already has Holed Out and E-Type under his belt. Apocalypse is by far his best work to date.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. With your highly advanced craft you must find your way around the planets and systematically annihilate the enemy. Your ship, which can fly or move along the ground, is extremely fast and can even fight whilst hurtling backwards.

The graphics are truly unbelievable. The solid, shaded 3 dimensional buildings and objects are animated more quickly and smoothly than ever before. If you shoot at them they explode in a way that is terrifyingly real often catching fire before bursting into a ball of flames accompanied by devastating sound effects.

Initially Apocalypse is easy enough for a beginner to enjoy but as you progress your foes will become increasingly hostile and you will discover fascinating new objects. These can have strange properties and many may need to be destroyed. It will be up to you to discover how.

The Royal Guild of Spacing will monitor your progress as you play. Your performance will be assessed at appropriate times and you will need to impress them if you are to continue your adventure. Apocalypse is an amazing game. There's only one way to describe it....

RAW EXCITEMENT.

PRICE: A3000/Archimedes £29.95

A3000/ARCHIMEDES

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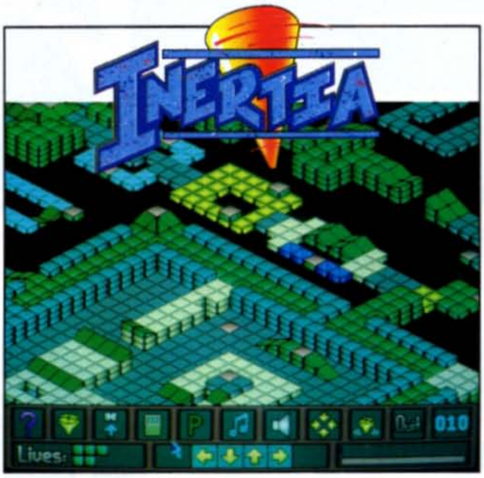

INERTIA

Inertia is a totally original game with a huge landscape just waiting to be explored. It is available for the Archimedes, BBC Micro and Acorn Electron. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide its speed and direction.

You have a 3 dimensional viewpoint displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties indeed. These include ice, jump and transformation tiles. There are even certain tiles which alternate the controls so that everything works in reverse.

This massive game has been very carefully put together and solving the puzzles within it will need lateral thought and a lot of dexterity.

The Archimedes version is considerably enhanced with digitised sound and music. It even features a full colour 3 dimensional map of the game which is a joy just to wander around. You'll certainly be amazed at the size of the game and the variety within it.

Inertia is a game for the determined. Each version makes full use of the ability of the computer so make sure you've got plenty of time to spare. Once you have started you won't be able to stop.

Electron User Golden Game May'90

*BBC Micro and Acorn Electron versions available **NOW**.*
Enhanced Archimedes version available in June, 1990.

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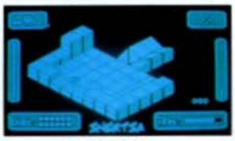
BBC B/MASTER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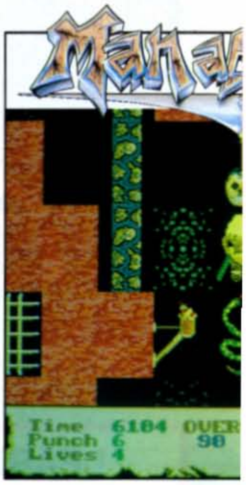

MAN-AT

In the age when the castle was supreme it took dedicated warriors to overcome their defences, to loot and pillage, and finally to destroy.

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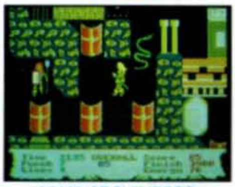
As you progress you will discover many intriguing objects which can behave very strangely. Many are documented such as wooden panels, hour glasses, thorns, portculli, mirrors etc.. But most are

PRICE: A3000/A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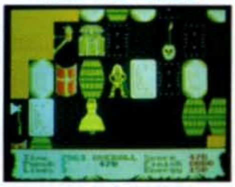
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-ARMS

not. When you think your stuck, experiment and you'll discover properties you never knew existed.

The subtle blend of arcade timing and adventurous puzzles make Man-At-Arms fiendishly addictive. You must plunder each of the 4 castles which become increasingly "puzzling". as you progress. Your overall objective is to kill all foes with your mighty sword and to plunder as much of the most valuable treasure as you can carry.

Man-At-Arms is a fascinating challenge with superb sound effects and music. No attention to detail has been spared and you can be sure of many late nights for weeks to come.

imedes £19.95

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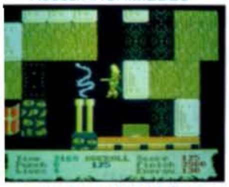

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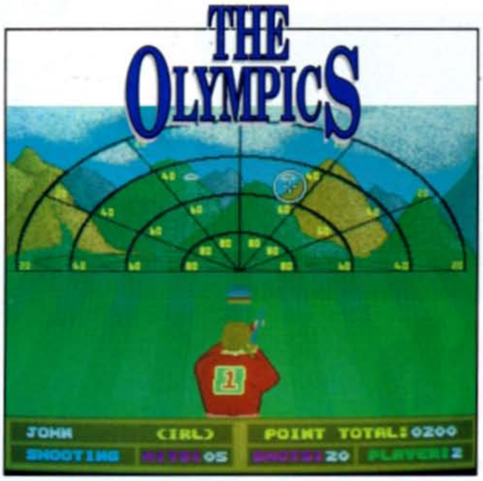


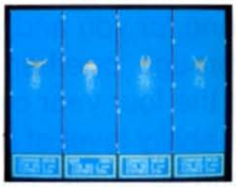
THE OLYMPICS

The Olympics is an experience which can be played by 1 to 8 players. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems. When a player wins a gold medal the national anthem for his chosen country is played. Any World Records that you achieve can be saved to disc. With the click of a button all the relevant information concerning the record is automatically saved including your name, the exact time, day and date!

It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perserverance, adaptability and above all guts!

The menu systems are controlled entirely with the mouse. As such they are extremely easy and quick to use. All events can be practiced or competed in individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hex-athlon" where points are awarded for each event - the player with the greatest number of points is deemed to be the winner.

PRICE: A3000/Archimedes £19.95



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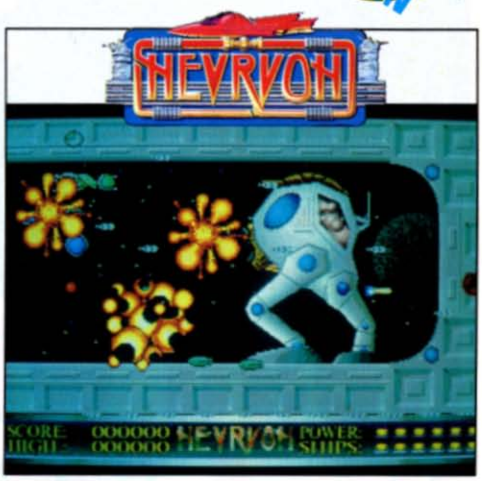

NEVRYON

This fast arcade game is disc based only and boasts 100K of graphics and game code for the BBC and 2 discs of over 1.5 megabytes for the Archimedes. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

You fly a spaceship which can attain immense firepower - more lasers, a ram, gun droids and highly destructive missiles which are released from the top & bottom of your ship, then ignite and shoot forwards.

Whilst the BBC version is superb, the Archimedes version has been considerably enhanced and is truly exceptional putting many arcade games to shame. Nevryon uses the machine's raw power to full effect and gameplay is second to none.

It comes on 2 discs and features 5 true levels of parallax scrolling, more than 50 objects on screen, over 1 megabyte of 256 colour graphics, digitised stereo sound and music etc. etc.. You control a different ship on each of the 4 scenarios and there are a seemingly infinite number of weapons to collect and use. End of level monsters are beautifully animated but are anything but friendly.

BBC Review: "Graphics are very colourful and hectic, with explosions, missiles and aliens all heading for your ship. Together with a scrolling landscape, complete with stars moving in the background, they combine to form an enjoyable and action packed game." Micronet, Feb'90.

*BBC Micro version available **NOW**.*
Enhanced Archimedes version available in June, 1990.

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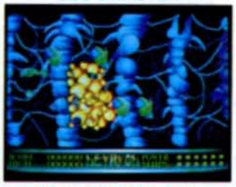

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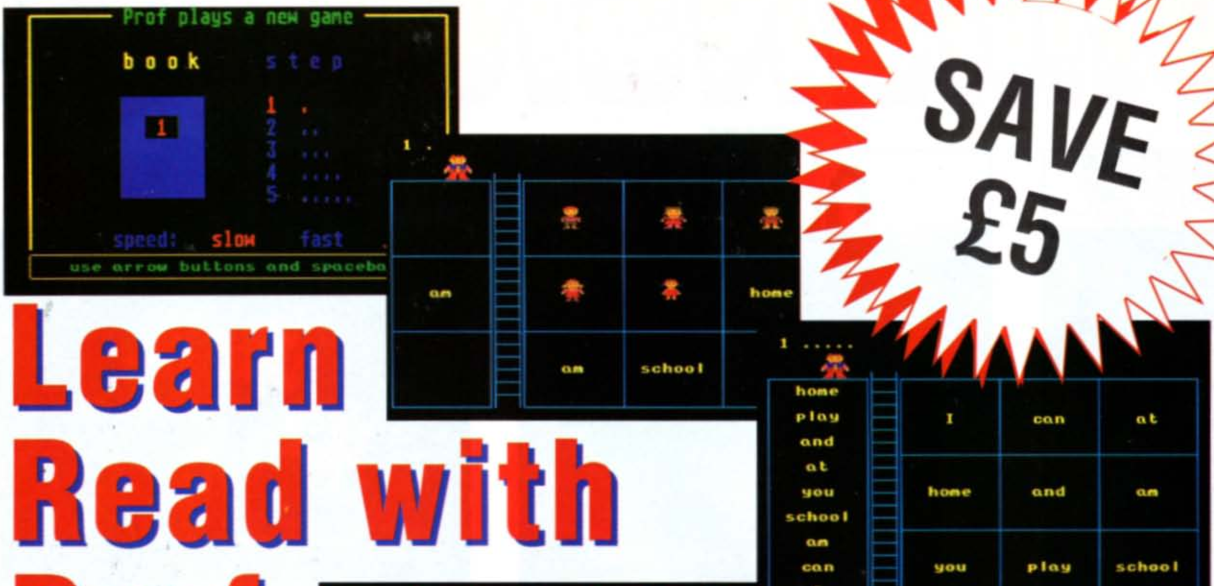
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UPDATE

Vital technology

A COMPUTER lab at St Martin's School, Northwood, equipped with 12 BBC A3000s has been opened by Sir Campbell Adamson, former director general of the CBI and chairman of Abby National plc.

Head of English at the school Alan Booth said: "Technology is now a vital part of school life, not simply because it gives children a headstart in their careers, but as a stimulus for imagination and problem solving".

At the opening ceromony Sir Campbell said that new technology had utterly transformed industry and large firms could not continue without the use of computers. He emphasised how important it it is for children to to be made familiar with micros.

Part of the compoter lab at St Martin's School, Northwood

More ports

DISABLED users are already gaining a significant benefit from the BBC A3000 thanks to Morley Electronics (091-257 6355). The company's recently launched combined Analogue/User port expansion allows add-ons like analogue joysticks, which are far easier to use by some people with special needs than conventional ones – and Concept Keyboards to be connected to the micro.

The unit, developed in conjunction with Acorn, has quickly found its way into several education authorities including Hampshire, Durham and Essex. It fits neatly inside the micro and both ports can be accessed using the standard built-in OS calls. Price, £69.

Helping hand

AN intelligent authoring system which is claimed to take the day-to-day marks for pupils in line with the National Curriculum and carry out several routine tasks, has been released by Pre-Emptor (0752 601164). It was developed by Brian Wright, a teacher and former researcher at the Open University Institute of Education and Technology, in response to the increased demands placed on teachers by the National Curriculum.

Pre-Emptor generates reports together with individualised work sheets. It costs £99.95 and is available for the Archimedies series or BBC B. Attainment target modules are also available for £24.95.

Prices slashed

IN the recently released catalogue of educational software from Scetlander (041-357 1659) prices to bona fida educational users have been cut by up to 50 per cent.

The catalogue contains details of 56 programs covering a wide range of subjects and ability levels and confirms the commitment to lower prices made by the company last year.

Managing director, Ron Lander, said: "No publisher likes to cut prices unnecessarily.

However, with resources for software acquisition stretched to the limit, we believe our approach is the right one, and the initial response from education and distributers has been most encouraging".

The new catalogue is available free from Scetlander or any of its distributers.

Micro prizes for letter writing

ACORN is once again handing over nearly £16,000 worth of equipment to the winning schools in this year's Royal Mail Letter Writing competition. Now in its sixteenth year, it is established as the most popular educational competition in Britain with a record 145,000 entries received last year.

With computers playing an increasingly important part in education, a new category has been added this year. Acorn will award a BBC A3000 system to the pupil in each age group making the best use of technology in the presentation of their entries.

Chris Humphries, sales and marketing manager for Acorn, said: "We want to inspire pupils to use computers in all aspects of conventional school work and recreationaland fun activities, such as writing to friends and relatives.

And with more children having access to micros at home we hope that the addition of this new category may encourage this enthusiasm".

Acorn will provide first, second and third prizes in each category with a BBC A3000colour system for their schools. Winners of the first prizes will also receive a printer, the Acorn Desktop Publisher package and word processing facilities. Each prize is worth between £1000 and £2000.

Techno Tots are ready for school

FUN School 2 from Database Educational Software (0625 859333) has now notched up more than 100,000 sales. This makes it by far the best selling educational software of all time, as parents seized the opportunity to get their tots off to a flying start.

The package gives tinies who use it a considerable educational advantage over their peers says Will Owen, of Heaton Mersey, Stockport, whose three-year-old son Thomas has been using the software for a year.

"I honestly think Fun School 2 has helped his hand and eye coordination, his counting and his recognition of left and right", said Will. "One of the most important benefits is that it has helped him work things out and solve problems by himself".

At the other end of the country five-year-old Daniel Parker of Kingston-on-Thames has been learning with Fun School 2 since he was three.

"Now he goes to school he thoroughly enjoys arithmetic as a result of using Fun School 2", said father John. "It puts the fun into learning for him and he gets far more enjoyment out of the puzzles than he does out of the usual shoot-'em-up games".

Fun School 2 for the under sixes costs £19.95 on Archimedes disc, £12.95 for 5.25in disc or £9.95 for tape.

Further selections are available to cater for six to eights and children of eight years and over.

Factor finder

Jon Millington starts a new series of quick type-in educational programs

THE micro is very useful for repetitive operations and simple mathematical rules can be programmed very quickly – for example finding all the factors of any number. To do this you need to try dividing your original number by every possible factor from one up to its square root – it doesn't need to go further.

By starting at one and working up, any large factors will already have been calculated since the number of times the factor divides into your original number is itself a factor of that number.

So type in the program here and use the checksums to get it right. Alternatively you can type it all in and try running it to see whether you made any mistakes. If an error occurs you'll have made a typing mistake – but why not have some debugging practice and see if you can work out the error you've made yourself without the checksums?

Once you've got it running, type in a number and can watch the micro searching for factors. When it finds one the display scrolls up to make room for further factors:

```
 1     345
 3     115
 5      69
15      23
```

So for the number 345, the program will immediately show 1 and 345, then 3 together with the number of times that 3 divides into 345, which is 115. And so on.

```
 10 REM Factors
 20 REM by Jon Millington
 30 REM (c) The Micro User
 40 PRINT'"Key 1-Normal 2-Double Ht"
 50 REPEAT
 60 H=GET-48
 70 UNTIL H=1 OR H=2
 80 MODE7
 90 REPEAT
100 INPUT TAB(9,22)"Your number? "A
110 FOR N=1 TO SQR A
120 FOR D=22 TO 21+H
130 C$=CHR$(H+139)
140 PRINT TAB(0,D)C$ N,A DIV N
150 NEXT
160 IF A MOD N=0 THEN PRINT'
170 NEXT
180 PRINTTAB(0,22)SPC(159)
190 UNTIL FALSE
```

Get it right ✓

```
 10 =    0 0      110 = C701 F
 20 =    0 0      120 = 1858 C
 30 =    0 0      130 = 5DB3 2
 40 = 7C8B B      140 = C729 B
 50 = BFBA 1      150 = 2C83 7
 60 = A668 F      160 = A6EF C
 70 = DF83 4      170 = 2C83 5
 80 = 8AFC 3      180 = 5128 7
 90 = BFBA 9      190 = 226C D
100 = AAD9 8
```

Variables

Name	Use
H	Height of the text.
A	Number you want factorised.
N	Divisor for your number.
D	How far down the screen the factors are to be printed.
C$	The teletext control code for single or double height: 140 or 141.

Program Breakdown

Line	Actions
40 to 60	Waits for you to press key one or two.
80 to 180	The loop that keeps the program running until you press Escape or Break.
90	Asks you to enter a number.
100 to 160	The main program loop to find the factors of your number.
110 to 140	The loop to print the current divisor and quotient.
150	Makes the display scroll up a line – or two lines if you chose double height numbers – when a factor is found to make room for any more.
170	Scrolls the display ready for your next input.

LASER DIRECT

THE ARCHIMEDES LASER PRINTER

The LaserDirect consists of an interface board, our RISC OS printer driver software, and a special version of the 300 dpi Qume six page per minute printer. Because the board drives the printer 'engine' directly, not only does this save a complex controller board usually resident in the printer, but it also means it prints very much faster than traditional printers. The speed is a combined result of our optimised RISC OS printer driver, the RISC processor and the unique 2Mbit/second data link to the printer. One other significant advantage is that the LaserDirect uses the Acorn outline fonts installed in the machine, so guaranteeing all fonts seen on screen will print - no need to make sure the fonts match those installed in your PostScript printer.

The result is a printer whose quality is the same or better than traditional lasers, that can use all RISC OS outline fonts, that is faster than traditional printers, and costs less.

Special features - Software on board means it is always available and can be automatically installed on startup - no loading from disc • The LaserDirect offers special links to other Computer Concepts software. For example, when combined with the new Scan-Light Plus software, it offers a direct scan to print facility. It can scan and print a full A4 page in under a minute. • A PostScript compatible interpreter will also be available, turning the Archimedes and LaserDirect printer into a very fast PostScript compatble printer (but using the Acorn outline fonts).

LaserDirect Qume (incl. printer, interface board, and software)
£999 +VAT & carriage

The Qume Liquid Crystal Printer is not technically a laser printer. Instead of having a laser and spinning mirror arrangement, this printer has a conventional light source shining through a liquid crystal shutter array. The result is fewer moving parts, a lower cost and a more reliable printer. It also occupies a very small amount of desk space - 42cm by 42cm, no more than a standard dot-matrix.

Compatible with all applications that use RISC OS printer drivers, e.g. Draw, Paint, Pipedream, ADP, Impression etc.

PERFORMANCE TESTS

	test 1	test 2	test 3	RRP
Typical PostScript	12'03s	5'13s	4'16s	£ 3000
Typical LaserJet	5'35s	4'29s	31'35s	£1400
LaserDirect Qume	2'43s	1'00s	4'29s	£ 999

Test 1 - A complex page of text and graphics from Acorn Desktop Publisher
Test 2 - The same test page from Impression
Test 3 - A 10 page text document from Impression

The LaserDirect requires a minimum of 2Mbytes of RAM in the Archimedes. However, the more memory available the better the performance. The tests were performed on an A420 machine (2Mbytes RAM) with hard disc. All times in minutes & seconds.

Computer Concepts Ltd

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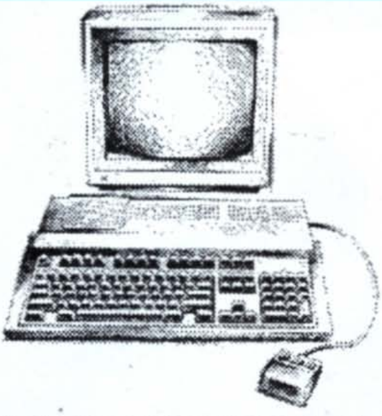

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Marshal Anderson reveals the secrets of on-line adventures and shows how to create them

PART TWO

Last month we looked at an actual example of how E-Mail was used to inspire middle school fourth-years to delve into the library. This month we'll look at how it's all done.

Suspending disbelief

AS more and more schools subscribe to some sort of electronic mailing system, and even more consider the idea, they are constantly on the lookout for some use beyond contacting pen-pals in Australia and ordering cases of wine. Being part of an on-line adventure can open up new horizons for you and your students.

The idea of the on-line adventure has been around for some time and has associations with the original adventure, in as much as problems are presented as text on a screen.

But instead of the author generating problems to be solved and then preserving them in a fixed program, each step is written after seeing the player's response.

Thus while the author might have a fairly fixed idea that the players should talk to a character they come across, if they insist on attacking it the whole course of the game can be altered *on the hoof.*

Naturally this presents a potentially exciting field for players and a very creative one for authors.

In the early stages it was an interesting experiment set up by those enthusiastic enough to find the time to carry it out and, given the creative aspect, is it not surprising to find that Mike Matson – of 4Formation – was involved in the genesis of this form in a project set up with the Anthony Bek Primary School in Derbyshire.

This was not an adventure in the traditional problem-solving sense – Mr Matson took on the part of Yllawyllis, an alien orbiting the Earth asking for information about our planet.

This led to some fairly heavy issues being discussed – the inequality of wealth in the world, wars and so on along with deceptively simple requests for information such as *What is a dog?*

The important discovery was that this exercise, in essence the same old Write-a-letter-to-an-alien task set for children at many levels, took on a whole new level of importance in pupil's eyes because of the nature of the linkage and the two-way conversation.

Not only did this give rise to considerable enthusiasm among the children, it soon became clear that those on the receiving end of this kind of activity are able to suspend disbelief totally and thus give the project a level of meaning often difficult to achieve in school.

More recently Derbyshire have put a great deal of effort and not a small amount of cash into continuing the development of on-line adventures.

It soon became clear that having an adult as the authoring end was nice but, apart from being impractical for most schools, it was also wasting half the opportunity presented.

With this in mind, projects were set up in which the pupils of a secondary school create the adventure for use by those in the primary school.

Our own experience with Jason and Emelda trapped in time, described in last month's article, began with contact from Evesham High School during the summer.

The proposal was that the two characters from the 17th century would be trapped in some never quite defined place by a never quite identified Time Lord from whom they could only escape by regaining specific memories of their own time.

This situation was totally accepted by the 12-year-olds involved and the research generated was of a level few other kinds of project could have achieved.

This was using the form at a very simple level, a kind of question/answer format with a few coded messages thrown in. However, the whole thing can be taken a great deal further.

The first part of setting up this activity lies in making contact with your partner school.

There may be a temptation to try and link with one some distance away, but although this is an attractive use of Email, it throws up many practical problems for the staff involved in keeping in touch.

Obviously you won't want to use Email for teacher to teacher messages. Even if you use a password to protect the text, the constant arrival of protected messages from the same source as the adventure is bound to arouse suspicion in the children.

Having linked up with a school both parties need to agree on the adventure's content. This will call for a certain amount of creative juggling of the lesson/project content in both schools.

For example, you might wish to use the adventure to set up science investigations at the primary end, and these will need to fit in, to some extent at least, with the areas the secondary pupils are considering.

This is going to be a more and more important consideration as the national curriculum takes hold, but whatever subject area or areas are chosen, both groups

➤

➤
will be fulfilling several attainment targets in terms of language and IT.

A very easy way around this problem in a secondary school is to make this a club-based activity in the first instance. After the first adventure you should have a measure of the possibilities and be able to integrate things more comfortably.

Having organised the groups at both ends, the adventure-writers have to come up with a basic plot. Here they can use many sources – children's fiction, existing adventures, especially those early ones by Scott Adams, books of maths investigations or whatever subject area is being tackled, there will be a huge list.

One area of great importance is the environment in which the adventure is set; this must be consistent and believable.

If you are dealing with a definite historical period your references will be obvious, but if you are moving into the future or some kind of fantasy there can be problems.

One option is to use a fantasy period already created, Greek mythology is one, but don't discount the wealth of material provided by role-playing games.

These have come a long way since the introduction of *Dungeons and Dragons* and you will be staggered by the range of environments detailed in the source books this hobby provides.

Having chosen the environment and sorted out the problems the adventurers will face in some sort of loose plot, it is best to begin a few contingency plans right away.

You know where the adventure should end and roughly how the team will get there, but what are the most likely deviations?

It is a matter of personal taste, I admit, but there can be a feeling of claustrophobia if the plot is too trammelled, if the reply is too often: "Never mind about that, it's not important."

If they want to explore the air ducts, let them, it's not your fault they're occupied by child-eating trolls.

You will also need to decide who the members of your party are, how they got into this mess, and how they are going to communicate with the target school.

The first tends to be a stock group. Create archetypes using *The Famous Five* or whoever, it does seem gangs offer most scope for plot development and can be used to explore human behaviour in a fairly meaningful way – though beware of stereotyping.

The second point may be that initially the group are in no danger at all, just calling in for a chat – then disaster befalls them. Again, the first call can be a cry for help. As to just how the contact is made, you can probably ignore this: "Jimmy's got a portable micro," or "We're transmitting on a hyperspace frequency" or, as in the example of Jason and Emelda, "We don't know."

Once the thing is under way it's a question the children stop asking.

For the adventure writers the range of writing skills used is wide. Not only have they to produce work that is accurate and clear, they will also need to write in the *voices* of several characters.

Narrative skills are then overlaid on that to develop a story in such a way that the very real audience never stop believing.

Once started, things can go anywhere, you may abandon your plot altogether, you may find that there is too much to get through and that you cut bits out and shorten the task, you should at all times be sensitive to the needs of the children at the receiving end. Most important is not to let them get bored or frustrated but never answer all their questions.

Keep a sense of mystery up to and beyond the end, let them want to know what happened after it all ended, leave the bad guys uncaptured if defeated – leave them wanting just that little bit more.

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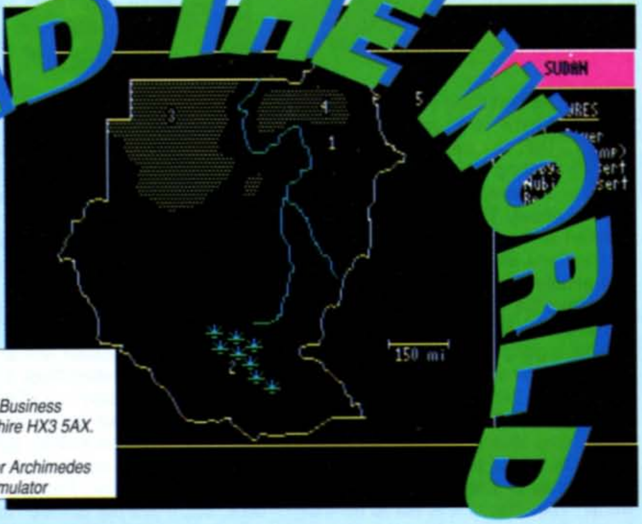
AROUND THE WORLD



Product: PC Globe
Price: £69.95
Supplier: AKL, Dean Clough Business Park, Halifax, North Yorkshire HX3 5AX.
Tel: 0422 330573
Requirements: BBC A3000 or Archimedes series with 1Mb and PC emulator

Globe-hopping Rog Frost comes down to earth with the Archimedes PC Emulator

WITH some programs you just have to look at the first couple of screens to put them straight into the brilliant category. PC Globe is such a piece of software. It contains a wealth of data about countries of the world and the means to access it in almost any way you might wish.

It is, of course, not primarily written for the Archimedes, so users must first ensure that they allocate as much memory as possible to the PC Emulator, either using a set-up program or from the Task Manager window. After that comes the usual procedure of loading the emulator and then the Dos boot disc.

There is a short installation procedure so that the software knows you have the equivalent of CGA graphics. Then it's time to insert the first Globe disc and load it up. After a short while you are advised to insert the second disc and you then don't need the first disc. The third disc may well be needed, since the majority of maps are stored on it.

I use a single disc system and the swapping of discs is not too much of a problem, being well prompted. The program contains a routine for installing the software on to twin disc systems or a hard disc.

When loaded, a world map is displayed. At the top of the screen is a row of menu options which can be selected with the arrow keys.

Any one of 177 countries can be chosen and the relevant one highlighted on the map using a user-picked colour. A database enables information to be obtained under 10 different headings, which include health statistics, the state of the economy and telephone dialling codes. More than 1,200 cities are contained in their database and their position can be found on the map.

If you want to know which countries are in a particular organisation these can be selected. It is an easy task to select, for example, OPEC and find which countries are a part of it.

Also available is a country comparison section in which the top or bottom 10 countries can be listed for some 70 different categories. These topics include health and population data and the production levels for nearly 50 different commodities.

It is possible to add your chosen country along with the top 10, or to select your own group of countries. World or region maps can also be drawn with countries displayed in appropriate shading to indicate, for example, their population density.

No typing is needed for any selection, all actions being selected by cursor keys and Return. The program is thus extremely user-friendly.

Individual maps are available for all 177 countries and these can show the positions of the main towns, the general relief or a selection of features which might interest a tourist. Everything, whether it be a map, a table or a graph, is printable and the program supports a wide range of dot matrix and laser printers.

The utilities menu contains a number of interesting features. Apart from routine matters such as selecting screen colours or dumping screns to the printer, it is possible to toggle the information between metric and imperial measures. A time zone feature offers the local time at any of the 1,200 cities. The time at any of the other towns can then be ascertained.

A similar feature involves currency conversion: Enter an amount of money in one currency and an exchange rate and see how much you get in a different country's money.

The distances and compass bearing between any two cities can also be found. An extra feature is the ability to enter your own little town or village, along with latitude and longitude figures to use as a starting point.

A problem with some parts of the program is that data quickly becomes out of date. The recent upheavals in the political organisation of Eastern Europe do not feature in the program. The listed rulers of these countries are very much those of October 1989.

The handbook – a concise and well written document – says that upgrades will be offered to registered users of the program at a reasonable price.

Having commented on the problem, it is fair to say that the program's competition is an atlas, which also goes out of date very rapidly – and there is no chance of updating them short of buying a new volume.

Summing up

PCGlobe does not replace the physical map – it does not contain enough detail for that – however, it contains a wealth of information concerned with the social, political and economic status of the world's countries. This is potentially a very valuable program for the domestic user. It should be an essential for all school geography departments.

Reading

Product: Learn to Read with Prof – Level 1
Price: £22.99
Supplier: Prisma Software, PO Box 211, St James Avenue, Chester CH1 3NJ.
Tel: 0244 326244

THE first thing you notice about Learn To Read With Prof is that the people involved in writing the accompanying literature know what they are talking about. The package has well defined and described aims and full instructions are given as to how you can achieve these aims, both at and away from the micro.

This offering is part one of what we must assume is going to be a complete reading tutor. I have not seen the rest of the series, but as far as this package goes we have an extremely well constructed and implemented early reading scheme.

Specifically the package aims to introduce a child to a sight vocabulary of 63 words. That means it is not to do with learning letter sounds – the phonic approach to reading – but is about learning word shapes as a whole. This is a nice way for a child to start off their reading as it means that in a very short time they can read books containing the words they know. However, there are a whole range of word attack skills that need to be learned alongside this kind of package, so it's just the sort of small, self-contained program that works well in the home supporting rather than upsetting what goes on in school.

The package is in three parts, the story, the game and reading books. The story comes on audio cassette with an accompanying disc of excellent Mode 1 graphics to illustrate it. The story is read by Patricia Hayes in a voice that you will love or hate and is full of positive stuff for the child, it says *"Look, it's not easy to read, you're not stupid if you find it hard because everyone does. But, if you pay attention to what is going on you will be able to read the books in the package"*. There's the nice touch that the central character is a girl and it is Dad she interacts with.

The story sets up the game and takes place around school and home. The whole package is set in this environment and so the age range of four and up is confirmed; a child without some knowledge of school is going to find the images and references alien.

Having heard the story you move on to the game – yes, I do mean *you*, you and the child. This software is not the sort you sit a child in front of and have them get on with it, they need you there – or someone with reading ability.

The game is very straightforward and operates at two levels of complexity. In the first a word is shown on the left of the screen and the child moves the little red man to it using the cursor keys and presses the spacebar. The word turns red, the child now moves the man to the same word which is one among several on the right of the screen. At the higher level there are several words to choose from on the left hand side.

The point about this game is that it

Magic spelling

Spelling Your Own Words
Price: £17.25
Supplier: ChalkSoft, PO Box 49, Spalding, Lincs PE11 1NZ.
Tel: 0775 69518

Phil Tayler Looks, Covers and has his Say

CHALKSOFT'S successful program – *Spelling, Week by Week* where children use word lists to practice their spelling – has been improved at the request of parents and teachers to include greater interaction, allowing children to enter their own words.

The format relies heavily on the Look-Cover-Say method so popular in schools, which I employ with my own class. Here *Look* is the word appearing on screen for a predeterined time, *Cover* is replaced by the disappearance of the word and *Say* becomes the child's attempt to type the word.

Different abilities can be catered for by accessing the teacher's menu via a password and altering the number of attempts per person and the times a word can be viewed.

Though I had not used the earlier program, it was easy to become familiar with the various menus, editing and entering of groups of words. Ten lists, each containing 20 words, are included and any set could be replaced with an alternative. Thus a series of tests could be held on disc, including ones for specific children or topics.

Children may choose their own test or be locked into one. If the latter option is selected the teacher can subsequently view the results of up to 10 tests.

An addition I would like is extra information covering the number of correctly spelt words on the second or subsequent attempt, or how many looks a particular child needed.

My pet aversion is to errors in educational material, and to find *Child choses a word list* is inexcusable. I also found that children with a longer name, such as Philip Tayler, would have the first part overwritten on screen if they entered an incorrect attempt.

However, my main reservation concerns the fact that no credit is given to for eventual success on a second or later attempt, and the percentage score is only increased for a correct answer first time.

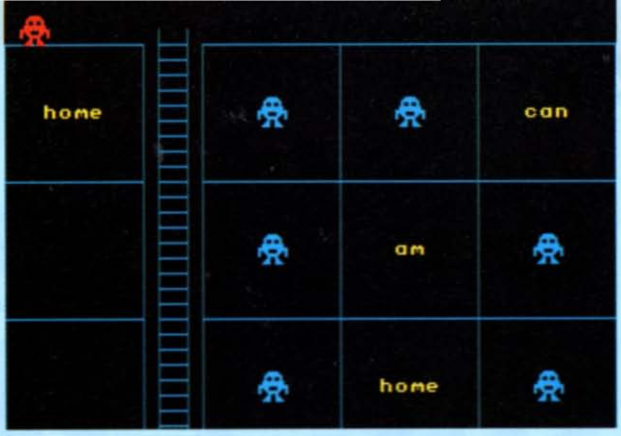
The educational value of such a program surely relies on encouraging children, where necessary, to look again at the word before attempting their version, but this program counts this as an incorrect response.

Summing up

My own three children enjoyed the challenge the program provided and I can report definite improvement in each case with specific words. This is an area where I can see some value as long as parents choose words wisely, perhaps from their child's reading book. However, I cannot imagine many schools being able to tie up a micro for this program, especially where teachers can continue to use the Look-Cover-Say approach as successfully with paper and pencil.

right

Marshall Anderson relives his first reading lesson



involves saying the word a lot. The child moves to the word on the left, you say the word, the child repeats it, moves to the word on the right and then alone says the word.

Not only is a given word being regularly rehearsed but also this exercises is developing the visual discrimination skills that the child will need throughout its education. Having completed a screen there is a repeat screen to reinforce the reading.

Once two consecutive screens of a word list have been completed without error a new list is presented. This takes you through the five steps the authors think it will take a child to learn those words and, because of the *"Repeat it 'till you get it right"* approach this works.

At the end of step five the child is ready to read the accompanying book. Children should not attempt to read the book before they have learned all the words. This means that the child will experience success with reading and enjoy the process rather than feeling this is something at which she or he must fail. There are five small books with nice illustrations and short stories based around the home and school.

Summing up

This is an excellent package of its kind. It introduces children to their first few words in a relaxed and non-threatening way. It uses the micro as part of an integrated experience that involves the books and other people as well, rather than just having it as the centre of the activity. The materials will sit as easily in the home as in the infant school and primary special needs department.

Crest of a wave

Phil Tayler goes monster hunting amid the surf

AS I have used most HS products with my class and with children with special needs, I was delighted to see this latest product containing two programs for the 7 to 10 age group. Monster Hunt is the first and deals with silent letters, while Surfari tackles the problem of the *sh* sound within words.

The idea behing **Monster Hunt** is contrived, with the monster – called the Gorgs – having hidden four dinosaurs, being the silent letter of eight words. The child has to identify these letters using the fire from his wrist laser. Success means liberation. The number of shots available and so the number of permissible mistakes, varies with the level selected.

Any two to four letters can be chosen from a menu, so the teacher should be able to concentrate the child on certain weaknesses. Unfortunately, the difficulty level and decision of which silent letters should be included have to be entered for each game.

This became a weakness in the classroom, because teacher supervision was necessary, especially with some slower learners. I would have welcomed an opportunity to set certain parameters, allowing children to work with a minimum of supervision. As with all this company's previous programs, the graphics are very appealing to primary children. The screen display is good, with large, clear letters in sensible colours. The animation is smooth and the optional sound is a pleasing diversion rather than an integral part of the program.

Product: Read-Right-Away, Reading Pack 3a
Price: £11.95 (disc)
Supplier: HS Software, Freepost, Swansea SA2 9ZZ

Some confusion was created by the slightly dubious choice of talk, calf and calm, each contain a silent *l*, while malt does not. Because of the very tight protection on the program, it is extremely difficult to alter these words, so that must remain a definite reservation on what is otherwise another creditable language aid.

Surfari tackles the tricky area of *sh* sounds in words using *si-*, *ti-* or *ci-*. This is faultlessly achieved through another game setting, this time involving riding the waves on surfboards and crocodiles.

The surfer selects letter from the choice of S, T or C. The chosen letter will complete the first word, which contains an asterisk in place of the letter. Wrong answers are acknowledged by a bleep, but a correct choice allows you to surf to the next word.

Subsequent lines involve surfing, waterskiing, and riding a whale's water spout. When all four words have been completed, there is a rather challenging and attractive game where the child's timing is well tested – getting the figure to jump on to the waves, crocodiles and so on.

Summing up

Certainly a program which achieves what it sets out to do, in a way that appeals enormously to 7-10 year olds.

Getting the PIP

Every school should have one. Valerie Band investigates

Product: PIP
Price: £195 (£9 for Upload/Download. BBC Micro software from Fernleaf £5)
Supplier: Swallow Systems, 32 High Street, High Wycombe, Buckinghamshire HP11 2AQ.
Tel: 0494 813471
Supplier: Fernleaf, 31 Old Road West, Gravesend, Kent DA11 OLH.
Tel: 0474 359037

PIP could be called a toy – but only as far as a turtle is one – and it certainly isn't cheap for a single piece of classroom equipment. To give it a thorough testing we placed it among a robust class and the National Curriculum.

Fitting neatly into level 2 Attainment Target II – covering the notion of angle section – Pip makes it much easier to put across the idea of rotating an object through 1, 2, 3 or 4 right angles and introduces simple programming techniques to give and understand instructions for turning through right angles.

It is equally useful on level 4 Attainment Target 11 where you must specify location by means of angle and distance: Logo commands for distance and direction are ideal for this, especially with the use of turtle or Pip.

Although these are the most obvious targets covered it's by no means all the little chap can be used for. Basically Pip can be whatever you want it to make it.

The shape is practical for going under other objects for attaching things to. You can add Lego baseboards, card or junk to the casing without damage. So Pip can become animal, vegetable or mineral to cover a particular class topic or illustrate a particular point.

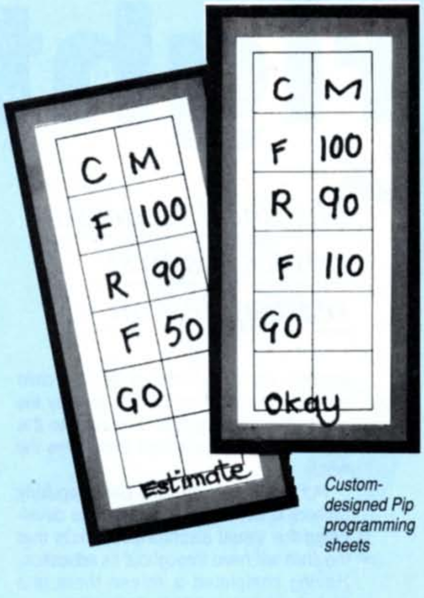
Pip has a pad with 24 keys – the 10 digits zero to nine and 14 command ones. These control movement in the various directions and there's also Repeat and End of Repeat keys. Entries can be cleared using CE, while CM and RM are used to cancel and restore memory.

There's a key to flash a light, one for musical notes and a test key – ideal for showing children some things Pip can do. Finally, you can press a key to pause.

Pressing any key always gives an audible response – a beep when entry is accepted, a grumble when it is wrong and a little song when the program is correct and finished.

The full keyboard could present difficulties for younger children, but if, for example, they are in the early stages of number development, the keys not in use can be covered with card leaving just 0 to 9, GO and CM (for clear memory) showing.

Pip initially looks like a boring toy. However, as soon as it is unleashed in the classroom its educational values become apparent and the children certainly learn while they play.



Custom-designed Pip programming sheets

Summing up

This rather interesting looking black box with wheels, keypad and the ability to interface with a BBC Micro is now a most valuable piece of child centred equipment. It is simple to use and guaranteed to motivate both children and adults.

Learning by doing, children discover right and left, angle of turn and length during problem-solving activities.

A case in point

Any vertical grouped class of 4 to 7-year-olds should be quite used to the teacher bringing into school something to look at – or inspire them – to get started on the next topic.

Pip was re-shaped as a cat and carried in, hidden in a bag. Interest was quickly aroused.

"Does it move?"

"Does it make a noise?"

"Is it another pet for the classroom?"

"Can we see it please?"

And out comes the surprise wrapped in a blanket. *"I can see some buttons"* was the immediate response.

Gary had to press one; *"I pressed the arrow. Why won't it go? It said, Hello but it didn't move"*.

"It wants to know how far", was the reply. The discussion continued; *"What shall we call it?"* Fluffy, Kitty, Cuddles, Candy Floss and Floss were all contenders.

Once named, the questions kept rolling in. What will Floss need? What will Floss like? Floss will need a bed and will like to chase butterflies, catch fish and mice.

So it was decided to create an environment for Floss. Space in the classroom was at a premium and the only suitable surface was craft and painting – a wet area. So Floss had to have a transportable world which could come out quickly and easily.

It was all enthusiastically started and we made it flowers and butterflies for the garden, some fish to go in the pond, a place for food and drink bowls and a bed to sleep in each night.

A topic on cats began and the discussion which followed when children worked with Floss subsequently covered English Attainment Targets – Participate as speakers and listeners in a group engaged in a task.

Floss became one of the family and was handled with care just like one of the class pets. The children found the needs of Floss were not as demanding in some

Pip as a cat

Pip and the micro

You can program Pip quite happily without ever going near a micro. However a special upload/download system is available which, with software available from Fernleaf, allows you to program it directly from your BBC Micro

The advantage of this system is that you can edit the program in full on screen before transferring it to Pip and seeing what effect it has.

ways but soon learnt that just as living things take food and liquid for life and energy, so Floss takes electricity to charge the internal battery.

So each evening when school finished, Floss was plugged in to revitalise ready for the next day.

Areas covered included; Science in the National Curriculum, level 2 Attainment Target 12 – know that information can be stored using devices; Level 2 Attainment Target 12 – be able to store information using devices. Know that information can be stored electronically in a variety of ways.

Level 2 Attainment Target 13 – be able to describe how a toy with a simple mechanism, which moves and stores energy, works. Level 3 Attainment Target 13 – understand in qualitative terms that models and machines need a source of energy in order to work. Level 4 Attainment Target 13 – understand that energy is essential to every aspect of human life and activity

Powering up in class

Ian Dickinson looks at what British Gas has to offer

CEDRIC 2.1 is an updated version of Cedric 2.2. Those of you that have used Cedric (Community Energy Display and Retrieval of Information) – data handling and statistics package produced by British Gas.

This new version takes into account suggestions of teachers who have previously used the package, so it should include various improvements.

The package would generally be useful to pupils of secondary school age. The software is on one 40 track disc and documentation is in the form of A5 booklets.

CEDRIC 2.1 contains a built-in database of both regional and national statistics about energy usage. The main aim of the package is to present pupils data in comparison with the built-in statistics.

The use of software and the preliminary work involved in data collection would be a useful exercise in many subject disiplines, and to gain the best from the package it would be advised to use it in a cross-curricular situation, involving possibly home economics, science and maths.

Once the software is loaded the user is presented with title screen, shortly followed by the main menu. The program is divided into three main catagories: Profile, DHL (Design Heat Loss) and Guestimator.

The profile section contains the statistics of the different types of homes within the UK and their use of energy. Once data has been collected, samples can be compared with regional and national information. You can choose to compare sampled data with your particular gas region. This can be produced as both tables and bar graphs, and a print option is provided for hardcopy.

The DHL section of the software is provided to help calculate the amount of heat that escapes from a home to the outside world. Using this section of the program will instigate much data gathering for homework and investigation of materials used in construction.

Guestimator asks questions about the types of homes in the group. It will then predict how much money will be spent on energy for each house. An important feature of the software is that groups of data can be entered and saved to disc – although the master household data forms can be copied and used within the school, the software itself can only be copied as a backup procedure. Licensing arrangements have to be made by contacting the Education Liaison Officer.

Product: Cedric 2.1
Price: £8.05 (£11.50 Econet version)
Supplier: British Gas, 326 High Holborn,
London WC1V 7PT
Tel: 01-242-0789

Access to the various parts of the program is from the menus provided. The software operation is fairly straight forward, but a familiarisation period would be recommended under a teacher's guidance.

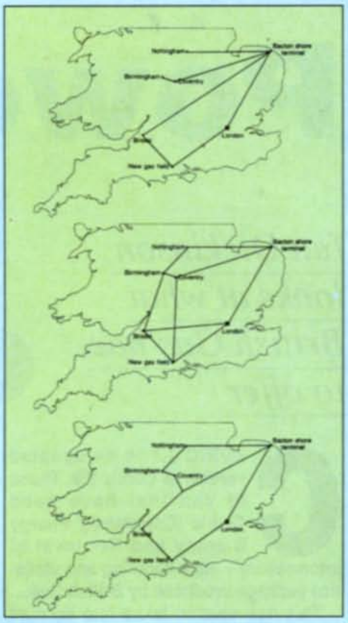
The documentation is split into a pupils' guide and teachers notes. The latter are adequate and to the point, but the pupils' guide should have been presented in a much livelier way. Some children would find it difficult to follow, and diagrams and examples would have been a help in explaining some of the principles involved.

The best part of the documentation are the household data forms provided. Altogether there are nine forms that pupils will have to fill in with data about their own homes and this part of the exercise will reinforce the concept that the output of the system will only be as good as the data entered into it. The last booklet contains a condensed version of these forms.

Overall, the program attempts to cover a difficult subject in a realistic and interesting way. It certainly encourages pupils to think about energy and related topics in a very practical manner. The data gathering is probably the most useful exercise and this will stress to the children the importance of the quality of information collected and entered into a computer system.

Summing up

The package would be a useful item in the software library for tackling energy related work even though the documentation could have been presented in a more amenable fashion – especially the pupils' guide. The best benefits would be gained by cross-curricular and topic work.



In the pipeline

Building a pipeline is a gas for

Ian Dickinson

MOST teachers and students have now experienced using software simulations of one sort or another. They can be a valuable resource in giving a real feel to situations that would normally be too dangerous or impractical to carry out in normal classroom settings.

These simulations have been of a mixed value and quality over the years. Some have died a quick death, never to be seen again, while others have stood the test of time and have become classroom favourites with both pupils and staff. Over the years there has been a steady progression away from the simple demonstration programs to more active user involvement.

The latest offering from British Gas is a simulation pack called Working Under Pressure – the software itself is called Pipe. Contained inside the sturdy A4 sized box is a small kit of resource material.

The Pipe software itself is stored on a single 40 track disc and you will also find a selection of useful goodies inside the box. There's a colourful, glossy magazine giving useful information about gas and where it comes from, how it is transmitted and other useful facts and figures. Next comes a simplified map of the national gas network. A very useful pamphlet that is also included in the package is one giving details of how Information Technology is used to aid the whole of the gas production system. This can be very handy for relating the Information Technology principles to the various aspects of business and is a good indication of how cross curricular Information Technology really is, especially in the industry and business world.

Two other books can be found in the package – the student's and teacher's handbooks. Both are very well put together and easy to follow. The former contains comprehensive explanations of how to use the software and encourages investigation and decision making.

So what of the software itself? For any simulation to have any real impact it must offer a high degree of interaction and also be easy to use and follow. This allows you to concentrate on the task rather than be pre-occupied with program workings.

Pipe is one of those pieces of software that allows this to happen. It is very well put together, and is loaded with the usual Shift+Break combination. Relevant keys to be used are always displayed on the screen. Selections are made by using the cursor keys, spacebar, Return and Escape.

Although the software can be used on stand-alone 8 bit BBC Micros, the documentation gives details of how to install it on Econet II and III. No site licence is required and the software can be freely used within the purchasing establishment. This makes it superb value for money.

The slick presentation is aided by the use of drop-down menus used to select the various tasks – the prime one being able to plan and design the route of a gas pipeline from one part of the country to another. You can access a useful help facility to guide you gently through the program if it is required.

The simulation involves decision making with regards to the thickness of the pipe and the pressure required to keep the supply running.

Compressors can be incorporated into the system, but the decisions are not always straight forward. Cost of implementation plays a major role.

Future demands have also to be taken into account, and the choice is complicated even more when seasonal factors are involved. The software even allows you to look back over previous year's demands – hopefully this would be useful date to take into account in predicting supply for the future.

The software is aimed at the over 14 age range and it would be useful to students studying A levels as well. As much or as little of the program can be used, depending on requirements and ability.

The teachers handbook is an excellent piece of documentation, it provides guidance and ideas if how to use the package itself and wider implications and applications. For example, it encourages:

- Learning about the gas supply industry.
- Learning about Computer Aided Design (CAD).
- Solving problems.
- Knowing how to communicate and present results.
- Learning to work in teams.

British Gas has managed to produce an excellent simulation package with the latest offering. The ideas will only be limited by the imagination of the teacher. Although essentially a package about the gas supply industry, it can open the doors to a whole range of related activities.

We are encouraged to bring reality into teaching and this approach does just that. The handbook suggest that it should encourage you to invite industrialists to come into school and also to arrange visits for students.

Presumably British Gas would be quite amenable to being involved in such activities, so why not give them a ring?

Product: Pipe (Working Under Pressure)
Price: £13.80
Supplier: British Gas, 326 High Holborn, London WC1V 7PT.
Tel: 01-242 0789

Summing up

The package is extremely well put together and the software easy to use and gives a valuable insight into the gas supply industry. Documentation is excellent.

I shall be certainly using the package as part of my teaching: It is a valuable resource which can be out to a very good use. This simulation package is most certainly worth every penny.

MIDNIGHT GRAPHICS

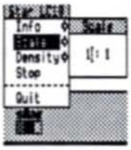
Multitasking Colour Sprite Dumps for the Archimedes

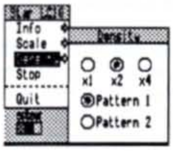
LC10 Colour Printer Sprite Dump

- Scaling available - any ratio is possible.
- Draft, double or quad density, for optimum speed or optimum quality
- Choice of special dithering patterns for best effect

The printer driver uses a dithering pattern to produce the required colour on the printout. The first pattern produces bright sharp colours, very similar to those on screen. The second pattern is used to reduce the 'moire' effect but results in more subdued colours.

A great deal of thought has been put into the patterns to produce the optimum results, bearing in mind the method the LC10 uses to perform it's colour printing. Experimentation with the two possibilities will result in improved performance.





Integrex & HP Paintjet Colour Sprite Dumps

- Two dumps which have been developed to provide more accurate colour representation than using the standard Risc OS printer drivers. Both are multitasking and install on the icon bar in the same way as the LC10 dump.
- The HP Paintjet dump has an Overhead Projection mode which allows you to utilise this useful feature, enabling you to create slides and transparencies for use in presentations. (This mode enabling the printer to place more ink onto the print surface).

CITIZEN SWIFT 9 & 24 Colour Sprite Dumps

- Two dumps for use with the superb Citizen Swift printers. Features as the LC10 Dump.

High Quality Draw Format Clip Art for the Archimedes

5 Victoria Lane
Whitefield
Manchester
M25 6AL

Prices

Printer dumps	
Citizen Swift 9 Printer dump	£26.04
Citizen Swift 24 Printer dump	£26.04
HP Paintjet Printer dump	£26.04
Integrex Printer dump	£26.04
LC10 Printer dump	£26.04
Draw Format Clip Art	
Set One (5 Discs of clip art)	£29.95
Render Bender Demo Discs	
Set 1 (4 discs)	£8.65
Set 2 (4 discs)	£8.65

TERMS: UK residents add 15% VAT to all prices, except books. Delivery FREE on all postal items in the UK. Export, no VAT, carriage at cost. Europe maximum 2.50 software. Access/Visa cards accepted by post/phone/in person. Official orders accepted from public sector/education/PLCs, otherwise cash with order. Tender invitations welcome. Price subject to change without notification. Goods offered subject to being unsold.

061 766 8423 / Fax 061 766 8425

Dial SUN for

Arthur Harvey creates low technology from high

ON the face of it sundials, which have been around since 300 BC at least, haven't a great deal to do with micros. All you need is a triangle fixed to a plate and then you watch it, hoping the sun stays out and mark where the shadow falls each hour. But here's a fascinating routine that employs your BBC Micro to give any DIY enthusiast a new project or form the basis of some useful educational study.

To get a fairly accurate time throughout the year the angle of a sundial's triangle – *gnomon* to give it its proper name – must be correct. Also the hour lines on the dial can be calculated, so this is where your modern micro comes into its own. All you need to know is your latitude, which you can estimate from our maps or find out exactly from an Ordnance Survey one.

Type in the listing, save it and find if you have made any errors using Get it Right! Type RUN, and after the introduction you will see a menu, to which you can return at any time by pressing Escape. Press H to select a horizontal dial, enter your latitude and the program will print a list of the angle of each hour line from the centre, as shown in Figure I.

This will enable you to have a dial engraved on your sheet of bronze, drawn on a card, or whatever. Press N for no printout and then Space, and the program will draw a plan of the dial so that you can see what it should look like, with the gnomon drawn at the side to illustrate its angle, as shown in Figure II. If you prefer, you can have a vertical sundial fixed to your wall, and this does not necessarily have to face south. From the menu, press V to enter the vertical dial program, type in your latitude, then enter the angle between the south and the direction your wall faces. Put 0 if it does face south. Next enter whether the angle is towards the east or the west, and again your micro will do the rest.

These vertical dials can look rather askew as, unless your wall does face south, the gnomon will not be on the midday line. The angle it makes with this line will be printed above the list of angles, and the position will be shown by a dotted line on the plan. Parts of a degree are shown and entered as a decimal, not in minutes of arc.

Vertical dials should be mounted with the noon line vertical – you can check this with a weighted string. Horizontal dials must be perfectly level, with the noon line running north to south. Check this at noon GMT. On both, the gnomon should be made of fairly thin material, say less than two mm thick, and must be fixed perpendicular to the dial. Its length should be made so that it gives a good shadow, and looks right on the dial.

It will, of course, show your true local time. If you live near the time zone line – the Greenwich meridian in this country – this will be GMT, but for every 15 degrees of longitude you are to the west of your local meridian the time shown will be one hour slow, or to the east, fast. Thus, in Cornwall, which is about five degrees west of Greenwich, the sundial will be 20 minutes slow. If you want a sundial in the southern hemisphere the dial is similar, but a mirror image. Add the following lines:

```
222 IF C=3 GOTO230
224 FOR C=4 TO 20
226 A(C)=-A(C):X(C)=-X(C)
228 NEXT:F=-F
```

Certain values – say with a horizontal dial near to the equator – give a gnomon angle so small that the gnomon is not high enough to produce a useful shadow across the dial. These are trapped by PROCerror.

The program uses the information you enter to calculate the angles and coordinates for drawing each hour line, using either PROChorizontal and PROCangles or PROCvertical. The latter also rejects any hour lines which would be above the dial. PROClist then prints the data. The dial outline is drawn in PROCdial and finally PROCgnomon draws the gnomon at the side and prints the latitude and also the direction faced by a vertical dial.

The dial data can be printed out and for those with a screen dump, so can the dial itself. DEF PROCdump, line 1290, is written for the Watford Dump Out 3 and should be changed to suit your rom. If you do not have a printer you can delete lines 240, 250 and 280, 290, 300.

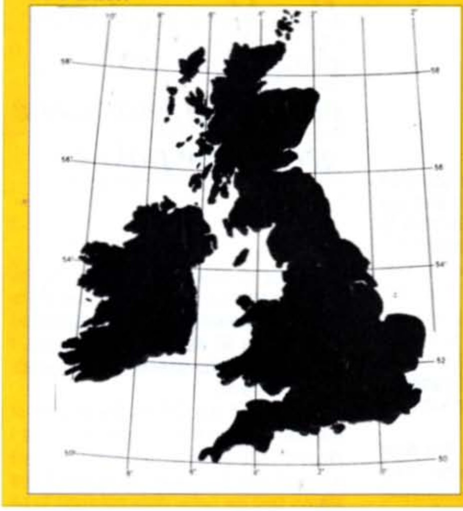
Remember that sundials cannot be highly accurate. Seasonal variations cause them to be a little faster in February and slower in October, but during the summer they should be correct to within a few minutes. However, they can be an attractive feature in your garden.

ARCTIC OCEAN
ATLANTIC
PACIFIC
OCEAN
OCEAN
INDIAN
OCEAN

World latitudes

DATA FOR HORIZONTAL DIAL	
Latitude and Angle of Gnomon	51.50 Degrees
HOUR	DEGREES (from Noon line)
4.00	-126.42
5.00	-108.90
6.00	-90.00
7.00	-71.10
8.00	-53.58
9.00	-38.05
10.00	-24.32
11.00	-11.84
12.00	0.00
13.00	11.84
14.00	24.32
15.00	38.05
16.00	53.58
17.00	71.10
18.00	90.00
19.00	108.90
20.00	12.42

Figure I: The sundial data



UK latitudes

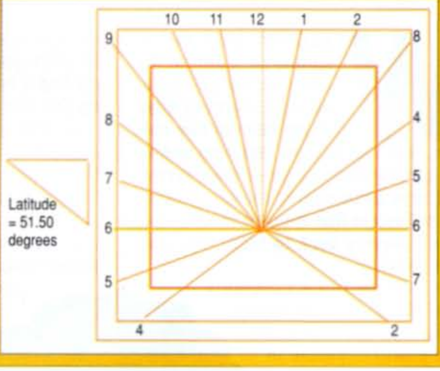


Figure II: The sundial platter and gnomon

the time

```
  10 REM SUNDIALS
  20 REM by Arthur Harvey
  30 REM (c) The Micro User
  40 ON ERROR PROCerror
  50 MODE 1
  60 @%=&2020D:VDU23;8202;0;0;0;
  70 DIM A(20),X(20),Y(20)
  80 PROCtitle
  90 REPEAT VDU26,20,12
 100 VDU28,10,20,30,6
 110 PRINT"SUNDIALS"''"MENU"
 120 PRINT'"H - Horizontal Dial"
 130 PRINT"V - Vertical Dial"
 140 IF Y(12)<>0 PRINT"R - Repeat last
dial"
 150 PRINT"Q - Quit program"
 160 REPEAT:PRINT'"Enter letter :-"
 170 K$=GET$:C=INSTR("HVQR",K$)
 180 UNTIL C<>0
 190 VDU26:COLOUR 3:COLOUR 128:CLS
 200 IF C=1 PROChorizontal
 210 IF C=2 PROCvertical
 220 IF C=3 END
 230 PROClist
 240 PRINT'"Print out list ?  (Y/N)"
 250 K=GET:IF K=89 VDU2:PROClist:VDU3
 260 PROCkey
 270 PROCdial:PROCgnomon
 280 PRINT'"Print ?"
 290 K=GET:VDU11:PRINTSPC(7)
 300 IF K=89 PROCdump
 310 PROCkey
 320 UNTIL FALSE
```

Turn to Page 121

End of th Citadel

This month's Power Pills

- Citadel endgame tips
- Citadel infinite energy for Master Compact Sam 1 disc version
- Labyrinth infinite lives for Acornsoft Hits Volume 2 disc version
- Arcadians infinite/extra lives for Acornsoft Hits 2 disc
- Arcadians infinite/extra lives for Master Compact versions
- Summary of March 1989 to February 1990 columns

Hac Man explores endgames and comes up with some great new pokes

WELCOME back to the home of games. In addition to the summary of my third year at the helm of this column, this month I am featuring pokes and tips for some golden oldies, games that have been around for many years but still retain that magical sparkle that draws players back to them time and time again.

In last month's column I detailed the steps necessary to find the three crowns and five power crystals in **Citadel**. I have since come across letters from Mark Cavill of Gloucester and B. Stones of Blandford, Dorset, both of whom have queries regarding the finish.

To complete Citadel you must collect the five crystals and put them on the pedestal in the Temple – just past the Wolf Guardian – one by one. When you have put the last one in place, jump on the pedestal in the Star Port and you will be transported to an identical Star Port on an alien planet, or so the story goes.

Now make your way right and collect the red/white key. Use it to unlock the red/white door to the left of the Star Port on which you appeared. Go left and you will find a jewelled statuette. Go back to the Star Port and return to your planet.

As soon as you arrive you will be presented with the message *Starport Destroyed* and another of *Reprogramming*. The screen will then disappear in a blaze of colour which lasts for about a minute and then the "Welcome to Citadel..." screen reappears emblazoned with the message:

Incredible! You Are Now Ruler of Citadel. You have now completed the game; press Return to start a new one.

Mr. Stones says that he finished the game with 93 per cent after collecting two crowns, the five crystals and the jewelled statuette. My finishing score when I played it through to check the above messages was 99 per cent, which many readers have said is the maximum possible. Arcade-adventures which display your progress as a percentage of the completed game usually only cater for a two-digit percentage, so that a full 100 per cent is not possible.

On my way to this 99 per cent score I collected all three crowns and all the energy bottles. I also took all the stone blocks to Stonehenge, and exchanged each one for 30 valuable energy points. I manipulated all the objects with the exception of the barrel.

Mark asks if I can tell him the purpose of the barrel. Well it hasn't got one that I know of. Certainly, all the letters I have ever received regarding Citadel have always said the barrel does not seem to be used for anything and I have never heard anything to the contrary.

I have even checked with Martin Reed, my one-time opposite number at the Electron User Arcade Corner and he says the same. Does anyone know differently?

Incidentally, in the September 1988 issue I featured infinite energy routines for the versions of Citadel that appeared on the cassette and disc versions of the first Play It Again Sam. I did not feature an equivalent routine for the Master Compact version, because at the time I did not have access to a copy of Sam 1 for the Compact. However, I am pleased to say that things have changed for the better, and I am now able to present an infinite energy routine for that version of Citadel in Listing I.

```
10 REM Citadel infinite energy
20 REM Master Compact disc Play It
Again Sam version
30 REM by Hac-Man 1990
40 REM (C) The Micro User
50 REM
60 FOR I%=0 TO 2 STEP 2:P%=&900:[O
PT I%
70 LDA #&4C:STA &547C:JSR &5436
80 LDA #&00:STA &3B26:STA &3BF0:ST
A &4EBF:STA &52A2
90 LDA #&EA:STA &38D1:STA &38D2:ST
A &38D3 \ infinite energy
100 JMP &54AA
110 ]:NEXT:*FX15,0
120 *KEY0 LOAD "CITADEL"|M 8400 CA
LL &900|M RUN|F|M
130 MODE 7:PRINT"Please insert Sam
 disc and hit a key...";:A%=GET
140 *MOUNT
150 ?&C461=&4C
160 VDU 21:*FX 138,0,128
```

Listing I: Citadel infinite energy for the Master Compact version of Play It Again Sam

Labyrinth

REGULAR readers may remember the February 1989 column in which I featured an infinite lives poke for Labyrinth, as featured on the Master Compact version of the Acornsoft Hits Volume 2.

I have since received a letter from Trevor Skelton of Folkestone, Kent who asks if I could provide an equivalent for the 5.25in disc version. Well, Trevor, no sooner

Typing in the pokes

All full length listings should be treated in the same way, like this: Type in the listing, save it on to one of your own blank tapes or discs, then type RUN, press Return and follow the on-screen instructions.

said than done – see Listing II.

Jon Antonio from Gravesend, also in Kent wants a cheat for Acornsoft's Labyrinth. Unfortunately, Jon has omitted to tell me which version of the game he has – and my extensive library lacks any of the original Acornsoft versions.

Consequently, if anyone wants help with any other version, would they please send me their tape or disc together with a stamped, self-addressed envelope and I'll see what I can do.

Incidentally, here's further instructions for February 1989's **Labyrinth** infinite lives poke that I omitted to mention at the time. When this poke routine is run the title page appears. However, to run the poke correctly you should choose Labyrinth – it will not be selected for you.

```
10 REM Labyrinth infinite lives
20 REM Acornsoft Hits 2 BBC 5.25"
disc version
30 REM by Hac-Man 1990
40 REM (C) The Micro User
50 REM
60 FOR I%=0 TO 2 STEP 2:P%=&900:[O
PT I%
70 LDA# 96 : STA 2484 : JSR 2416
80 LDA# &AD : STA &3723 : \ infini
te lives
90 JMP (2554)
100 ]:NEXT:*FX 15,0
110 MODE 7:PRINT "Please insert Ac
ornsoft Hits disc 2 and press a ke
y...";
120 A%=GET:PRINT
130 *LOAD LABRNTH
140 CALL &900
```

Listing II: Labyrinth infinite lives for the 5.25in disc version of Acornsoft Hits 2

➤

The third great year

To continue with the index to my Hac-Man columns, here is a summary of the columns of my third year – March 1989 to February 1990. Before we start, I should point out that the September 1989 column included a request for help with level 3 of Superior's Ravenskull. A number of readers responded with solutions which I have yet to check, but it has occurred to me that it might be better to print a solution for level 2 before one for level 3. Can anyone oblige?

March 1989

Grand Prix Construction Set saved data solution for Master Compact.

Saigon cheat mode.

By Fair Means or Foul tip.

The Empire Strikes Back cheat mode.

Fireball cheats.

Quest reincarnation facility.

Repton Thru Time passwords and edit codes.

Deathstar level jump

Call for help with Master versions of games on Peartree sideways ram board.

Barbarian II preview.

April 1989

Barbarian II preview.

Palace of Magic *get the frog* description.

Exile runes translation.

May 1989

Labyrinth infinite lives poke

Apology for bug in invulnerability poke for 5.25" disc version of **Palace of Magic**

Explanation of 40/80 and double-stepping disc techniques

Invulnerability for Play It Again Sam 3 disc version of **Palace of Magic.**

Orion cheat mode.

Quazer passwords.

June 1989

Barbarian II update.

Maltese Joe's Pool Challenge update.

Castle Quest Master conversion for disc.

Repton 3 disappearing skull/fungus bug.

Clogger passwords

Spellmaster vs ATS clash.

July 1989

Bonecruncher cheat.

Arkanoid disc infinite lives.

Cholo finale preview and competition.

Update to **Codename:Droid** solution and pokes.

A text file of this pokes compilation is on this month's subscription disc and tape so that you can load it into your word processor or database.

August 1989

Galaforce 2 hints and tips.

Syncron passwords.

Impact passwords.

Elite cheat facility for Master Compact.

Request for BBC Micro rugby game.

September 1989

Skirmish *invulnerable Pterodactyl* tip.

Repton Infinity passwords.

Pipeline hidden music.

Warehouse cheat mode.

Quazer vs Risc OS incompatibility.

Elixir vs Watford DFS incompatibility

Request for help in **Ravenskull** level 3

October 1989

Boffin tips.

Hunkidory cheat mode.

Omega Orb cheat mode.

Request for help with **Nightshade**

Availability or otherwise of **Space Hi-Way**

November 1989

Master conversions write-up inc. **Strike Force Harrier**

Castle Quest tips.

Master 512 games compatibility.

Fix for **Life of Repton** editor bug on disc version

Wizzy's Mansion cheat mode.

December 1989

Hac-Man high score table – second round.

Holed Out to Basic I conversion.

Sabre Wulf to Master conversion.

Disc games on Opus DDOS write-up.

January 1990

Superior news

Apology for incorrect caption on September 1989's **Ballistix** screenshot

Tetris handicapped start.

Gunsmoke key redefinition.

Repton 3 passwords write-up.

Starquake (not) on Master Compact write-up.

Moonraider (not) on Master Compact write-up.

February 1990

Ballistix passwords and tips.

Pacmania pokes.

Apology for **Stryker's Run** misprint.

Qwak! passwords.

Update to **Snapper** upgrade.

```
10 REM Arcadians infinite/extra li
ves
20 REM Acornsoft Hits 2 BBC 5.25"
disc version
30 REM by Hac-Man 1990
40 REM (C) The Micro User
50 REM
60 FOR I%=0 TO 2 STEP 2:P%=&900:[O
PT I%
70 LDA# 96 : STA 2484 : JSR 2416
80 LDA# &AD : STA &583E : \ infini
te lives
90 LDA# 3 : STA &4EBE : \ number o
f lives
100 JMP (2554)
110 ]:NEXT:*FX15,0
120 MODE 7:PRINT "Please insert Ac
ornsoft Hits disc 2 and press a ke
y...";
130 A%=GET:PRINT
140 *LOAD ARCADE
150 CALL &900
```

Listing III: Arcadians infinite/extra lives for the 5.25in disc version of Acornsoft Hits 2

Arcadians

ON the Acornsoft Hits Volume 2 is the first game on which the name Orlando ever appeared. Orlando will perhaps be better known for more recent hits like Zalaga, Frak! and FireTrack, but **Arcadians** was the first game on which this multi-talented programmer's pseudonym ever appeared.

Readers with good memories may recall the September 1987 column in which I described a few methods of devising your own pokes. One of the three games that I used as examples was the aforementioned Arcadians. Methinks it is high time a few more Arcadians players benefit from infinite lives.

If you own the 5.25in BBC Micro version of Acornsoft Hits Volume 2 use Listing III and Master Compact owners use Listing IV, and note that the Acornsoft Hits title page will appear as normal. However, you should not attempt to choose Arcadians as it will be selected automatically.

I have not written an equivalent poke for the cassette version of Arcadians because my tape hasn't arrived yet. However, I hope to be able to present one in the not too distant future, so never fear, tape owners, help is not too far away.

```
10 REM Arcadians infinite/extra li
ves
20 REM Master Compact Acornsoft Hi
ts 2 version
30 REM by Hac-Man 1990
40 REM (C) The Micro User
50 REM
60 FOR I%=0 TO 2 STEP 2:P%=&900:[O
PT I%
70 JSR &1F0F : LDA# 1 : JSR &7150
80 LDA# &AD : STA &5E41 : \ infini
te lives
90 LDA# 3 : STA &54C1 : \ number o
f lives
100 JMP &1F00
110 ]:NEXT
120 MODE 7:PRINT "Please insert Ac
ornsoft Hits 2 disc and press a ke
y...";
130 A%=GET:PRINT
140 *MOUNT
150 ?&C413=&F2
160 *RUN !BOOT
170 !&21B5=&60AA00A9:CALL &900
```

Listing IV: Arcadians infinite/extra lives for the Compact disc version of Acornsoft Hits 2

DISCS DIRECT

Cut out the middle man. We import our OWN DISCS from the far East.
Guaranteed 100% Error free + money back guarantee.

3.5" DISCS + BOXES

25	3.5"	DS-DD 135 TPI with 50 Capacity Lockable Storage Box	£18.99
35	3.5"	DS-DD 135 TPI with 100 Capacity Lockable Storage Box	£28.99
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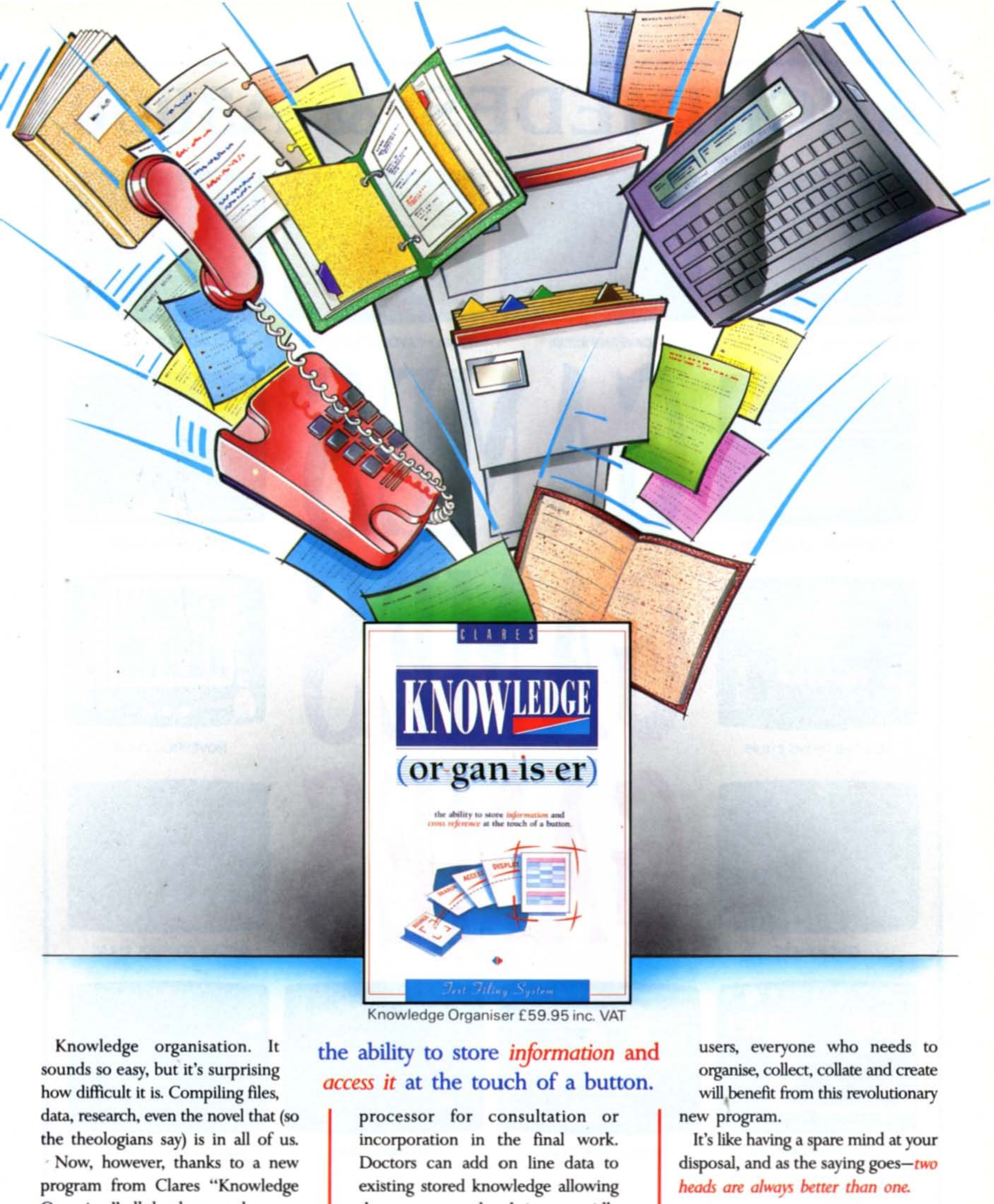
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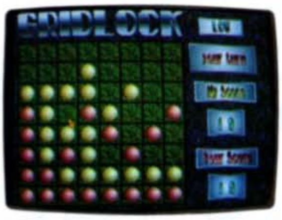

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Richard Hull ends this series by showing how to write programs for his database

Data basics

GENERALISED database systems have one major disadvantage – you need an expert's grasp of all their commands in order to use them. To overcome this they usually have a programming language which can be used to produce an easy-to-use interface, and ours no exception.

So far we've looked at the simpler commands: CREATE, OPEN, CLOSE, READ and WRITE. Now let's see how to put together programs that will run the database automatically.

The first thing you'll need is a word processor that can create pure text files. Wordwise, Wordwise Plus, Mini Office II and View will work, but with View you should ensure you don't use any special effects such as stored commands, rulers, markers and so on.

Let's consider a number guessing game to show how a program is put together:

```
\ Random number guessing
\
.start
cls
display(0,0) "Enter a number:"
string STR$(RND(9))
compare FNinput(1)
beq winner
\
display(0,2) "Bad luck"
jump confirm
\
.winner
display(0,2) "You were right!"
\
.confirm
display(0,3) "The number was "
calc $
wait(2)
jump start
```

Try typing this in to your word processor, save it as *Game* and then run the database itself. At the command line prompt type:

```
program Game
```

And the game will run – just type in a number from 1 to 9 to see whether it matches the one chosen by the program.

The programming language itself is a combination of high level operations with the ability to use Basic keywords like STR$ and RND. But with flow control on the level of assembly language, you can conditionally jump to labels – *beq winner* – but nothing more than that. However this is sufficient for simple work.

How to program

There are no storage locations apart from a string accumulator which can be up to 256 bytes long. This is represented by *$*, and can be used wherever you want the contents of the accumulator to appear, for example:

```
display(10,5) $
```

This will print the string in the main window of the database display starting at the tenth position on line five.

To set the string accumulator to a value you use the STRING command like this:

```
string "Hello, world"
```

But, in addition, wherever you have a string that's going to have something done with it you can use any Basic keyword that results in a string, or even functions that are in the Database program itself. So you can have:

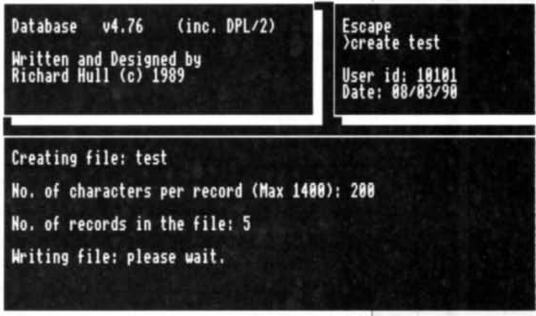
```
string STR$(9)
string STR$(LEN("123456789"))
string TIME$
string LEFT$(TIME$,3)
string GET$
string FNinput(3)
string FNconv(FNinput(3))
```

All these put a value into the string accumulator. The first two put in "9"; While of the next two the first deposits the current date and time and the second places just the day of the week (Master only). The fourth takes the next keypress – but Return cannot be stored.

The function *FNinput* will take a string of user input of the length specified by the parameter while *FNconv* converts a given string to lower case.

Database jargon

Database: All the data about a particular subject held together in one file. For example, all the names and addresses in a name and address database.
Record: A set of related data about one item within a database. For example, the name and address of one person.
Field: One particular piece of information in a record. For example, surname or post code. However in this program all the data for each record is held in one *free-form* field.



```
Database   v4.76    (inc. DPL/2)

Written and Designed by
Richard Hull (c) 1989
```

```
Escape
>create test

User id: 10101
Date: 08/03/90
```

```
Creating file: test

No. of characters per record (Max 1400): 200

No. of records in the file: 5

Writing file: please wait.
```

National Curriculum

Certain areas of the National Curriculum require knowledge of how to enter and retrieve information from a database. The program and its associated language provide a simple method of reaching these targets.

Flow control

AS mentioned, program flow control is achieved using simple conditional branch commands, but first the various internal flags need to be set, this is achieved using the *COMPARE* command like this:

```
compare FNconv(FNinput(4))
```

The string after the command is compared to the accumulator and the internal flag set. Now you can use one of the branch commands shown in Table I. Labels that you can jump to always appear with a full stop at the start of a line.

Another internal flag is set if you use the OPEN command on a file that is not on the disc – or that the file name is wrong. There are a couple of branch instrcutions that

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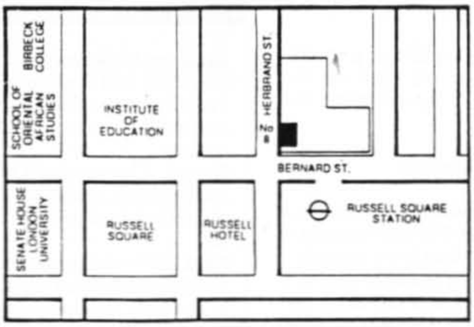

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Branch command	Action
BEQ	Branches to the given label if the two strings last compared are equal.
BNE	Branches if the last comparison was unequal.
BPL	Branches if the string in the *compare* command is greater† than the one in the accumulator.
BMI	Branches if the string in the *compare* command is less† than the one in the accumulator.
BNF	Branch if file not found.
BFO	Branch if the file exists.
JUMP	Always jump to the specified label.

† Greater and lesser when comparing strings refers to the ascii values of each part of the string in turn so "ABC" is less than "abc".

Table I: Flow control commands

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allow you to compensate for this situation as well.

Other available commands are listed in Table II and you can see how they are used in the sample program given in the listing – you'll need to make a diary database in command mode using CREATE before running the program.

Templates

To make inputting data consistent – bearing in mind you can put information anywhere within the total number of characters allotted per record, you can use a template.

You can create one by typing BUILD plus a filename. You are then given the screen to edit as if you were writing data to the database. So from here you can set up your template like this example:

```
Name:..........................
Address:.......................
        .......................
        .......................
Post Code:..........
General:.......................
        .......................
        .......................
        .......................
```

Once finished, you press Escape as usual and the template is scanned and saved. Now, assuming that the template is called *address*, if you enter:

```
TEMPLATE address
```

each time you want to WRITE data to the file the template is loaded on to the screen before you begin editing. This ensures that the data follows a standard format. The template is always set up to the same size as the records for the currently open database.

By following the style of the program you can add further commands such as *SORT*. Such an addition must be in the form of a function:

```
DEF FNsort:...
```

Any variables used must be LOCAL and files opened by the routine must be closed by the end of it – especially if an error occurs. If this does happen either terminate the routine with the function that generates the error – for example if a database file isn't open:

```
...THEN=FNfilopen
```

or report the error and use *=FNerr*. If finishing correctly you should use *=0* or *=FALSE*. The best way to expand the commands is to examine the original listing very carefully and follow these rules.

● *And that's all there is to it – a complete database management system with its own programming language. Very easy to use and with the capability to show what more advanced, professional packages can provide.*

```
\ DBMS diary/planner
\ by Richard Hull
\ (c) The Micro User
.loop
cls
display(6,0) "Database Diary/Planner.
Richard Hull (c) 1989"
display(6,1) "-------------------------
------------"
display(2,3) "Menu options:-"
display(3,5) "1 Open a new file."
display(3,7) "2 Read a record."
display(3,9) "3 Write a record."
display(3,11) "4 Edit a record."
display(3,13) "5 Search records."
display(3,15) "6 Erase a record."
display(3,17) "7 Operating System
```

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Commands	Action
ASCII [file/OFF]	Opens a file to spool record data in ascii format as it is read. The file is closed using *ascii off* and can then be read into a word processor.
BUILD file	Creates a template – with the name *file* – the same size as each record of the currently open database file.
CALC calc	Evaluates and prints the calculation, it uses the Basic EVAL command.
CAT	Displays the catalogue of the current directory.
CLOSE	Closes the currently open database file.
CLS	Clears both the input and output screen areas.
CREATE file	Creates a new database file with the name *file*.
DATESTAMP file	Date stamps any file with the current date and user id.
DISPLAY (x,y) string	Displays the given string at text coordinates *x,y* on the screen. *x* is 0-76, *y* is 0-22.
EDIT ref	Allows the record with the specific reference to be read and edited on screen.
ERASE ref	Deletes the specified recird from the database after requesting confirmation.
EXTRACT file	Search for match of given string in ref field or data field, spool output to *file*.
LIST file	Outputs the contents of the ref file called *file* – created by *extract* or *search* to the screen.
OPEN file	Opens for accessing and update an existing database file with the name *file*.
QUIT	Exits the program, closing any open file.
PRINTER [ON/any]	Asks whether the reference field of each record is to be printed plus number of linefeeds to follow each. From here any record that is displayed is automatically printed. Use ON to switch it on and any other character to switch off.
PROGRAM file	Load and run the database program called *file*.
READ ref	Get the record with reference field *ref* from the database.
SCAN file	View the records whose ref fields are contained in *file* as created by *search* or *extract*.
SEARCH file	As for *extract* but user can view each record. If the printer is on or *ascii* spool active the data is output to the appropriate device.
STRING string	Evaluates the string – which may contain functions and Basic keywords – and places the result in the accumulator.
TEMPLATE file	Makes the database system use *file* as the template for inputting new data each time a WRITE is invoked.
UTILITY file	Closes all files then runs the Basic program called *file*.
WAIT(x)	Pause for *x* seconds.
RESET	Puts the printer to its default – switch on – state.
WRITE [n]	Add 1 to n more records to the database.
*****	Execute a system star command – you can even use ** $* to perform the command held in the string accumulator.

Table II: Commands available in the database language

```
*Command."
display(3,19) "8 Quit diary."
display(2,21) "Select number (1-8) "
.num
string GET$
compare "1"
beq open_file
compare "2"
beq read_rec
compare "3"
beq write_rec
compare "4"
beq edit_rec
compare "5"
beq search_rec
compare "6"
beq wipe_rec
compare "7"
beq os_com
compare "8"
bne num
quit
\
.open_file
cls
display(0,0) "Enter diary database filen
ame: "
string FNinput(30)
open $
jump loop
\
.read_rec
cls
display(0,0) "Enter date (or ### to end)
: "
string FNinput(8)
compare "###"
beq end_read
read $
wait(5)
jump read_rec
.end_read
jump loop
\
.write_rec
cls
display(0,0) "How many entries ? "
string FNinput(2)
write $
jump loop
\
.edit_rec
cls
display(0,0) "Enter date to edit, or ###
 to end: "
string FNinput(8)
compare "###"
beq end_edit
edit $
jump edit_rec
.end_edit
jump loop
\
.search_rec
cls
display(0,0) "Name of reference file: "
string FNinput(30)
extract $
wait(1.5)
jump loop
\
.wipe_rec
cls
display(0,0) "Enter date to be deleted:
"
string FNinput(30)
erase $
wait(8)
\
.os_com
cls
display(0,0) "Enter *Command:-"
display(0,1) "*"
string FNinput(60)
*$
wait(3)
jump loop
```

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More expansion?

I WANT to expand my BBC B beyond the inadequate add-ons produced by various companies, and believe the Eurocard with added power and slide-in printed circuit boards could provide the answer. Could you advise me about the best place to start? – **J. Dillon, Wembley, Middlesex.**

● *The Eurocard is unfortunately not the solution – it only describes a size of printed circuit board. You can get a rack for it and slide in various boards, but how are you going to get your micro to recognise anything you attach?*

The only spare memory space is the 512 bytes allocated to the 1MHz bus. This could be mapped on to a Eurocard rack but what then? Half a k is not much and there is no way Basic – or any other software – could use it.

Finally, Eurocards and racks are quite expensive and therefore offer no low cost solution.

Sticky drives

I OWN a 32k BBC B Micro OS 1.2 with Acorn DFS dual disc drive and have recently had disc loading and saving difficulties. When I insert a disc in the drive and try to load it, first I hear the usual loading sound but the micro reports: *Disc fault 18 at 00/00.* Pressing Break and repeating the attempt results in a soft noise – not the loading sound – and the micro reported the same error.

I've tried all of the other disc filing system commands that try to load to no avail – the effect is the same on all the other three sides.

After up to 50 attempts the drive suddenly starts working and I have no problems, but if the drive has to be left off for a period the problem recurs.

Have you an idea what could be wrong and what can I do about it? I would appreciate your advice. – **A. Kusuma, Rotterdam.**

● *The problem probably lies in the track zero switch, which registers when the head is at track zero. If it overshoots it will be stuck beyond track zero.*

When this fault next happens take the lid off the disc drive and slide the head forward a little.

If it then works it confirms that that is the problem. The head will probably just need to be re-aligned.

CAPITAL COMPLAINT

THERE seems to be something wrong with the Caps Lock key on my Master 128k. When I switch on the light over the Caps Lock label lights up but when I press the Caps Lock key it doesn't go out. This has happened since we added the Quest Paint rom from Watford Electronics. Another thing is that when I press the Shift Lock key the light over the Caps Lock label goes out. This is meant to happen I know, but then I just can't get the Caps Lock back again without pressing Shift Lock until the red light saying that I am on Shift Lock comes on.

Then I have capitals, though when I press Shift Lock again the lower case text comes up. This is very annoying, please could you tell me what to do? – **Tim Wiser, Matlock, Derbyshire.**

● *Remove Quest Paint and get it replaced – it shouldn't happen.*

Indecisive drive

I OWN a BBC B Issue 7 OS1.2 fitted with Quest Paint and Acorn DFS 1.2 and a single 5.25in 40 track, single sided disc drive. I have recently noticed that more and more games do not work properly.

My copy of Exile fails to load most of the time and Holed Out! produces spurious graphics and odd reports. My older games work properly, but many of the more recent releases malfunction.

When I borrowed a friend's machine they work perfectly but when I borrowed a friend's copy of Exile that also failed to load on my machine.

Before now I have not really bothered to do anything but recently while looking through my back issues of *The Micro User* I decided to type in Ram Wars and Orbits.

I used checksums to make sure it was correct and typed in the program Mars perfectly until line 1370. At this line the checksums indicated an error which I corrected.

I then rechecked and found that the micro had apparently re-written the error, so I tried again and the same thing happened. Removing Quest Paint did not help.

What is causing these problems and what can I do about it? – **Martin Cartwright, Emsworth, Hants.**

● *As your older programs work on your drive while your newer ones do not, you might be suffering from head width problems. Many new drives are 40/80 switchable and these will have half-width heads. If the new games have been created on one of these then only a narrow track is recorded on the disc. Your full width head is then only picking up half as much signal*

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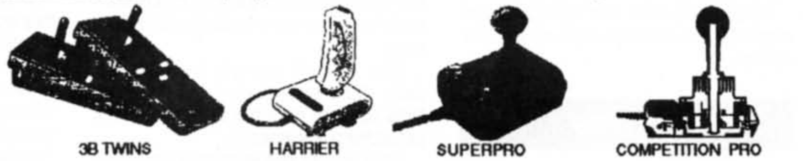

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This should be no problem, but there might be some other signal on the other half of the track left over from, say, the testing process. This will interfere with the required signal and make things run closer to the limit. It seems that short of getting games manufacturers to make you a copy on a true 40 track drive you will need a switchable drive.

The problem with your micro putting back a specific error sounds as if you have a single bit of bad memory. To make sure, put in a remark line before the offending one, this will move things to a different memory location, so see if the problem goes away. If it does it means that you have a bad memory chip which will need to be changed.

A3000 robots

I HAVE decided to build a robotic arm for a GCSE assignment and want to interface this with my A3000 with external podule casing and the Acorn I/O podule fitted. I was wondering if you could give me some advice on this subject?

Also is it possible to program eproms with the A3000? I can only find eprom writers that plug into the BBC B and so on, and none at all designed for the Archimedes. With the eprom writer I was hoping to blow some of my own Wimp programs into eprom form for instant access. – **M. Folkard, Newcastle upon Tyne.**

● *The mechanics of building a robot arm are, to say the least, a little beyond the scope of this column, although the interfacing of the controls are not. What you need are some back issues of* The Micro User. *Virtually all aspects of interfacing were covered in the May 1984 issue.*

As you will need to control more than two, perhaps you need the multi-input/output board covered in the December 1985 Micro User. *The only change you will have to make in the software is in the direct accesses to memory – ?&FE60 – for the appropriate osbyte calls to write to page Sheila, see the I/O podule guide for more details.*

As for eprom programmers, as far as I know none have been produced for the Archimedes, although there is no reason why one should not be plugged into the 1MHz port on the I/O podule. This would probably necessitate re-writing the software to produce legal commands, although the new version of !65Host might be able to cope with the direct poking to memory.

Shadowy problem

IN regard to Tony Thompson's query in your January 1990 issue, from experience on my micro I can advise that the symptoms described are exactly what may be expected if the micro is fitted with a shadow ram card and this is not first turned off before changing from Basic into Wordwise.

As Mr Thompson advises that he uses a second-hand machine, it may be a shadow ram card is fitted and he is unaware of it. I have the Aries B32 shadow ram card fitted and it requires *XOFF 2 before the *W. for Wordwise.

It could be worth trying this, or checking whether an alternative type of shadow ram is fitted. – **Mike Castle, Cambridge.**

● *Thanks for that tip. When answering problems I have to rely on the information sent to me. The letters as printed are edited so that non-relevant information is excluded. However, when writing to me please include as much information about your setup as you can.*

Illegal calls

I AM thinking of building an automatic dialling system using my micro, rather than wearing my fingers down on my phone dial. Is there a way of generating the signals used in the dialling system and outputting them through a port to the telephone? Or is it possible to get a signal through the speaker which I can record and play back? – **D. Skeeles, Hitchin, Herts.**

● *While it is possible to have an automatic dialling system controlled from your micro it is illegal to fit a home made system to any British Telecom equipment.*

The nearest you can get is to have a BT approved modem with an autodial facility.

Even if you are on one of the new automatic exchanges which uses tones as opposed to the pulsed system, it is still illegal to play a tape recording to effect the dialling.

Ripple effect

I RECENTLY bought a second-hand Archimedes 310 colour system. However, I have noticed a rather peculiar monitor fault. When I use the !Draw application – and some other software – and the window border turns yellow when I start to edit, faint grey lines ripple up and down the screen, with gradually varying speeds and a faint buzz or hum comes from the speaker.

Leaving the edit mode usually stops it – loading !Maestro into memory slightly reduces this effect. Could you please tell me what is causing this and if there is any cure? I am not too knowledgable in electronics. – **Jonathan Ferndeen, Ealing, London.**

● *The problem is caused by the microprocessor in the Archimedes interfering with both the video and audio circuitry. Having said that, the cure is not so straightforward.*

This interference is inevitable so close to high speed digital circuitry so supply decoupling components are included in the micro to reduce it to an acceptable level. However, due to tolerances in components it can be worse on some machines than others. This was especially true on the earlier A310s.

There is a Field Change Order that Acorn dealers are able to perform to reduce this. If you want to do it yourself solder a 100uF 10 volt or greater capacitor across pin 7 (positive) and pin 4 (negative) of IC68. Make sure the leads are as short as possible and fix it to the board with a spot of glue or wax. The flexible glue from a hot melt gun is good. However, as IC68 is under the bar that holds the disc drive you will have to dismantle most of the machine to get at it.

More memory needed

I AM a trainee software engineer and am therefore forced to use a lot of IBM software. I have an Archimedes 440/1 but the problem is that when using the PC emulator I only get 320k ram and 10 meg on the hard disc. Is there any way in which I can change this so as to gain as much memory and disc space as possible? – **D. Richardson, Wednesbury, West Midlands.**

● *With a 1M machine it should be possible to get just over 500k of memory using the PC emulator. In order to free more memory go to the task display and remove everything you don't need so the free memory is maximised.*

In particular look at the ram disc, sprite memory and font memory. However if you have your system upgraded to 2Mb or more you will get the full 640k.

As to the hard disc capacity, you need to partition the disc for more space and alter the command file on your MSdos boot up disc.

Scene shifting

THE display on my BBC Micro has shifted one inch to the right. Can you please tell me how to move it back? – **Andrew Owen, Inverbervie, Angus.**

● *The most likely explanation is that it is a monitor fault. See if you can adjust the vertical shift – there will be a control inside the monitor, but watch out for the high voltages.*

However, it could be that the micro is generating a video signal with too much back porch delay. This could be checked on an oscilloscope. If this is the case it is likely that IC2, the 6845 video control chip, needs replacing. Watford Electronics sells replacements.

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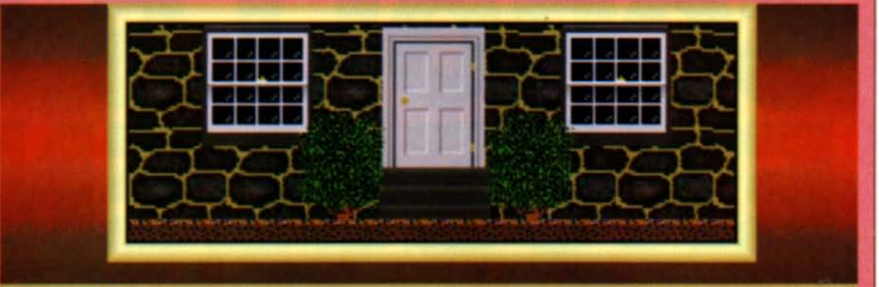

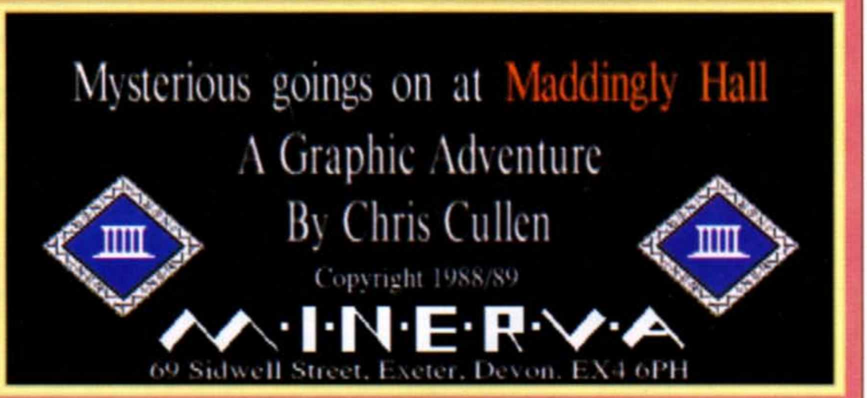

Mysterious goings on at Maddingly Hall

A Graphic Adventure

By Chris Cullen

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MINERVA

69 Sidwell Street, Exeter, Devon. EX4 6PH

THIS is the first fully-illustrated adventure to come my way. Pictures are well drawn and, while a whisker below the quality of Magnetic Scrolls graphics, are better than those I've seen on most games for the Archimedes.

The scenario and background are amusing, and break new ground in adventure games.

I am a long-time fan of the stories involving Bertie Wooster and similar characters.

Well, Bertie Hall the (anti?) hero in this adventure is a 26-year-old layabout straight from the membership list of the Drones Club.

Quick to bet on slow horses, Bertie is seeking the best way to salvage a carefree and workfree way of life. He also wants to entwine the delectable Veronica in his arms permanently. Both ambitions require money – and plenty of it.

Bertie's aim is to ingratiate himself with crusty Aunt Agatha – a Victorian viperess who makes Lady Bracknell look like the types played by Barbara Windsor in the Carry On films.

You start off just inside the ground of Maddingley Hall, Aunt Agatha's stately pile, also inhabited by various other aunts and uncles who are either dotty or crusty or both, together with various retainers.

The servant who is most forbidding – and inhibiting at times – is the butler. He always seems to waft in on the scene just when you would prefer him to be in his pantry polishing the silver.

There are plenty of locations to visit without having to do any specific problem solving – something I like in adventures It allows the atmosphere to be sampled and you can get into the *feel* of a game more easily.

I wandered around, visited the station, examined the grounds of Maddingley Hall in some detail, shinned up the odd drainpipe, and explored indoors, poking into this and that quite profitably while I drew up a picture of what was needed.It didn't take long to establish that I was up against a move-counter used in an entertaining way.

A major task to accomplish is that of turning up for dinner at 7.30 pm in the dining room properly dressed. Examination of my watch proved that each input costs two minutes.

Starting time is 4.20pm, so there should be enough moves – with a few to spare – to do it.

However, I fell foul of the parser in several ways. And here, to my mind is the game's Achilles heel.

I had a suitcase (locked) but possessed no key. This is illogical, but I ferreted around and found a brass key – the suitcase had a brass lock.

I tried every way I could think to unlock the dratted case, but the parser would not acknowledge any of the attempts.

Testing it in many locked doors produced an appropriately null response. Yet my dinner suit *has* to be in that case – I never go anywhere remotely posh without it, even these days.

Similarly, I found a boat, a lake and an island. I may not be a walking thesaurus, but I could not find a way of getting that fatherless means of aquatic locomotion to perform a single movement.

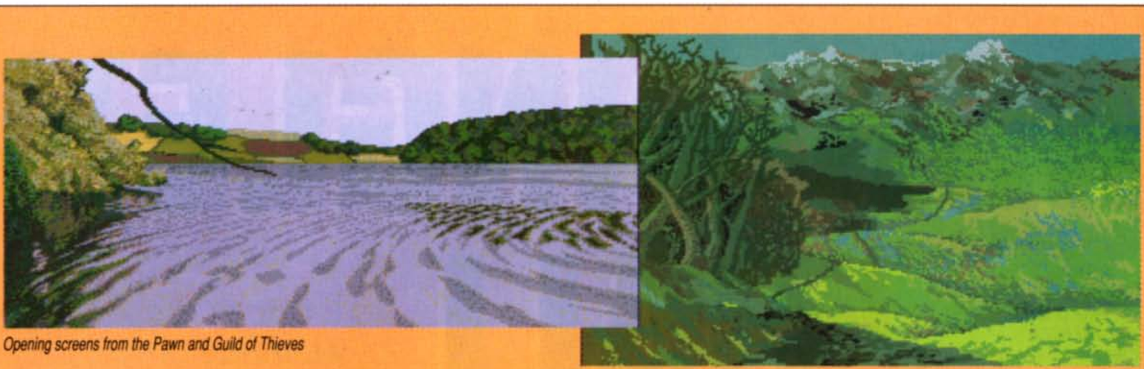
Last straw was when, during some interior exploration, I came across some steps leading upwards. I, somewhat naturally, entered UP.

The response from the parser was *The some steps leading up is closed.* In desperation I tried OPEN STEPS only to get. *You can't, it's locked.*

Add the fact that the parser reckons the majority of the pieces of furniture described in precise detail by the text, and depicted faithfully in the illustrations, do not actually exist, and you will perhaps see why I entered QUIT for the last time. After all, I'm a reviewer, not a play-tester. This game could be brilliant, but there's work still to be done.

Mad Hatter

Presentation	*6*
Atmosphere	*8*
Graphics	*9*
Value for money	*4*
Overall	*6*



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LISTEN carefully, I will only say this only once: Sit down, write out a cheque for one or both of these adventures, and send it off at once to the address shown. *Then* you can carry on and read why.

Let's indulge in a little history: Magnetic Scrolls, producers of the only adventures which have a similar consistency of excellence to Level 9, had their stuff distributed by Rainbird Software, a subsidiary of British Telecom.

That was fine – except for the fact that little or nothing was scheduled for the Archimedes – until Telecom decided to wind up its game software divisions. A bleak future loomed.

However, Magnetic Scrolls managed to get hold of surplus stocks of the Rainbird packaging material and have duplicated their program discs into them, and the sole distributors are now Inter-Mediates. I am thrilled about this, because I have been longing to see these two award-winning adventures in the Archimedes format.

Apart from the disc, each adventure package comes with assorted goodies, the most important being a booklet: *What Burglar* accompanies **Guild of Thieves** and *A Tale of Kerovnia* joins hands with **The Pawn.**

These booklets each contain a supplement with a number of encrypted clues designed to help you out at various strategic points. Don't think Magnetic Scrolls are daft, though: You can't wander your way through either adventure just by decoding the hints and bashing away. Some clues are only revealed once you have scored a minimum number of points – very sensible.

The other side of the booklet's value is not revealed until you have either chalked up 100 moves or have attemped to restore a saved position.

You then are asked to look up something in the booklet's text – and you are given page, line and word number. Three wrong entries and the game crashes.

This is a sensible and trouble-free backup to the disc protection.

The illustrations exploit the graphic capabilities of the Archimedes as no other software house has yet done. I raved over the illustrations for **Fish** and **Corruption** and I might have sounded over the top to those who haven't seen them.

Nothing has changed. The illustrations for these adventures are of the same superlative quality. I looked first at **Guild of Thieves**, which is of the classic "get all the treasures you can" style. There I was, happily in a boat moored by a jetty, in the company of the master thief who was eyeing me up and down with a look of utter contempt.

I was eager to get away, and remembering that the jetty was described as to the west of the boat, I entered W. I'll now hand over to the adventure's text to give you the flavour.

Happily, as though without a care in the world, you step out of the boat on to the river. Remarkably the water fails to support your weight! Leaning over the side of the boat, the master thief catches you by the arm and pulls you out of danger.

This is a typical example of the textual standard an adventurer can expect, witty and literate, it is at all times well put together. If your Archimedes doesn't have sufficient memory for pictures, each game will stand on its own merits as a text-only adventure.

Once I'd stopped laughing myself silly, I re-read the initial description of the location and got cracking. This earned me five whole points – the standard reward for solving puzzles as far as I can see. At this juncture I did what I always urge every adventurer to do whether they are beginners or experts. I entered *Inv.*

Before you start any adventure game seriously it's important to see what assets, if any, you have. I found I was wearing my official uniform of striped sweatshirt and jeans and carrying a swag bag ready for my loot.

Examine is often an essential part of the adventurer's armoury, so I used this verb to discover that I had already been light-fingered and that I had a piece of plastic, too. I reckoned I stood a chance of seeing in the dark and also of possibly getting into some otherwise unopenable doors.

I haven't completed either adventure yet, but I've certainly had some fun. I can pass on a few tips nonetheless. In the dim and distant past I was a cub and I recollect that being prepared and doing good turns came high on the list of necessary qualities.

These same qualities will come in very useful in **The Guild of Thieves** if you are to make much progress. Helpfulness may not get you a welcome everywhere in life, but it certainly turned into an access card for me.

When I found myself exploring the Temple precincts I soon discovered that being prepared was vital. As I peered, prodded, poked, prayed and pulled my way around it, I found that I needed to know when to hang on – and when to let go, as well.

One last piece of advice where this game is concerned: The descriptions need to be read very carefully indeed at times. Valuable clues are planted there, and when you come across an item that can be worn don't waste too much time in donning it – the proper use of gloves can help you go up in the world.

Now to **The Pawn** and its initial scenario. On the way home from the supermarket you get mugged and when you wake up you are in the strange land of Kerovnia.

I got off to quite a quick start in this adventure – I didn't get wet, anyway. Early on I met this wizard, and he asked me if I'd be so kind as to run a little errand for him. Being naturally nosy, I read the note which I was supposed to deliver to King Erik – and was very glad indeed that I had saved my position first.

I then did some wandering around in a general kind of way and met a Guru. Normally, Gurus aren't my scene at all and when this one fell about laughing just because I was wearing a wristband I felt thoroughly cheesed off. He wanted something elementary as well.

Next I popped in to the Palace gardens and pottered into the potting shed to collect one or three useful items. I was glad I remembered to take my own advice about the value of the word *examine* in these adventures where the location description mentions something in particular.

The guards were ever so nice to me when I minded my manners and said *please, please, please* when they were a bit stroppy about letting me in. Mind you, the King wasn't all that pleased to see me when I gave him the note to read. I have a feeling I really screwed that one up. I'm a bit stumped about what to do in the clearing at the moment, too. Ah well that's adventuring.

What I want now, most of all, is to stop bashing away at the word processor and get back to playing both of these superb adventures.

It's one of those rare occasions when I consider writing a review an interruption that is less than totally pleasant.

I want to spread the news about two brilliant games for the Archimedes – that's a normal feeling for me with any good adventure – but, where **The Guild of Thieves** and **The Pawn** are concerned, I don't want to spend a second more than I have to away from the games themselves.

Mad Hatter

Presentation	*10*
Atmosphere	*10*
Graphics	*10*
Value for money	*10*
Overall	*10*

STREET PATROLLER

Bailed out on a felony rap

– THE RE-MIX

Price: £4.00 (tape only)
Supplier: Central Computing, 61 Beech Road, Gillway, Tamworth, Staffs B79 8QQ. Mail order only.

BACK in 1986 there was a text adventure called Street Patroller. Now it has been completely re-written, and Street Patroller – The Re-Mix is the result. As only the main character and a few locations survive from the original this can really be considered a brand new adventure.

Paul Grace is a young policeman whose career is threatened because he was in the wrong place at the wrong time. On the day a new bank opened Paul was visiting his parents nearby.

Then robbers raided the old bank, and although one brave citizen tried to stop them they raced away in a flashy white and red car.

Paul had just left his parents' home when the car approached him and a masked man wielding a gun took him hostage.

The chasing citizen just had time to hurl a brick at the rear window before the car sped off again.

A photographer for the Daily Gossip couldn't believe his luck when the car passed him, and his photograph of Paul looking out of the rear window caused a sensation.

The thieves eventually released Paul, unharmed and his superiors decided to give him the benefit of the doubt as the Daily Gossip was noted for ill-founded rumours.

Trouble really began when an eye witness saw the damaged car being used in the robbery of the royal jewels.

The Daily Gossip put two and two together and the headline LOCAL COP IN JEWELS THEFT couldn't be ignored this time. A police inquiry is ordered and the preliminary hearing is set for the end of May.

The adventure begins on May 2, the day you, as Paul, are due to be formally suspended from duty. You are told you have until May 25 to catch the thieves, recover the jewels and so clear your name. You think they are hiding somewhere close to town. There are more than 80 locations skilfully and naturally arranged, making excellent use of all eight compass directions.

Extensive exploration will discover most of them – the elusive ones can only be accessed at very precise times. For example, you must find out the best time to visit the programmer, who is the most interesting of 15 characters. Others range from a drunk to an expert gardener, but only one of them is a woman.

As they play such an important role in the adventure you may be wondering how you know the current date, time and weather situation. A leaflet gives a clue to the means and a lot of money will buy a wonderful device that seems to do everything except give you a full solution to the adventure.

You are allowed to work for up to 16 hours before tiredness overcomes you.

Each ordinary input advances the time by five minutes, but occasionally you will have to hang around – shades of Dodgy Geezers here – so WAIT followed by a number between 1 and 19 advances the time by that number of hours.

Similarly a number between 20 and 55 will advance the action by that many minutes, so WAIT 4 then WAIT 30 means you stand around for four and a half hours.

The weather can hamper your plans as the program discourages movement in a fog, and a sudden downpour can have destructive, albeit rectifiable, consequences.

If you have to jump to a certain date because of adverse weather or an important appointment you can type WAIT UNTIL (the date). Other commands range from a simple abbreviation for a compass direction, to GIVE (something) TO (someone), and IT can be used to refer to the last noun mentioned.

Scoring is kept as in a cricket match. If you do something silly such as getting photographed in a compromising situation you lose a wicket. First time round I was 0 for 1 after only two moves.

If you find yourself at an impasse such as arrested for vagrancy, typing RESCUE will result in a cheerful HOWZAT! – another wicket down and you are transported to a secret location.

I couldn't find much sympathy for the main character, who isn't above unlawful activities himself. Nevertheless, once I had a good credit rating, enlisted some help, and learned not to sleep in the subway, I was determined to catch the thieves and win the match.

Barbara Gibb

Atmosphere	*8*
Playability	*8*
Presentation	*7*
Value for Money	*8*
Overall	*8*

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FREE

Teri Paul starts a new regular feature in which she'll be picking over new software that costs next to nothing

In the public domain

PUBLIC domain software is a concept that may be new to you so let's start by defining what the various, often confusing, terms mean. First there's PD software itself: The author of the program, instead of trying to market it commercially, simply gives it away, allowing anyone to copy it or re-copy it and hand it on to anyone else – there's no copyright at all.

However there's also no guarantee that PD software is any good either – but a lot of it is and that's what makes it such an important area.

You might also hear about shareware, which is similar to PD in that you can copy it and pass it around. Shareware is almost always good quality and up to professional standards, but what you don't get with it is the manual.

If you like the software and want a manual so that you can use it properly you send a registration fee to the author and he'll send you the manual and often a better version of the program. It's a cheap way of marketing your work.

One other type of PD software is available. Like !Projector from Ace Computing, which allows you to freely distribute and play any films created on its animation packages.

PD Libraries

So how do you get hold of PD software or shareware? Both types are available from PD libraries who will charge you between £2.50 and £5 for a disc jam-packed with programs – some good, some not so good.

But hold on a minute ... isn't PD software supposed to be free? Well it is, but what you are paying for is the PD library resources, the disc, the time spent putting it all together, the fact that somebody is willing to spend their time copying discs for you.

And believe me, after you've seen some of the demos, music, games and serious applications that you can get from the public domain you won't mind paying. Just remember, in PD software there's no guarantee of quality: You pays your money and takes your chance.

There's no limitation to the type of software you can obtain. Peter Sykes of A.P.D.L. has sent me two discs with samples of what he has on offer. Most of this software will also be available from the other libraries but often bundled in different combinations.

Graphics demos are supported by !BackImage, where the Archimedes logo moves slowly around the back of the screen behind any windows. Then there's Baby Blues, which is a small window containing two blue eyes which watch the mouse pointer as it moves around the screen.

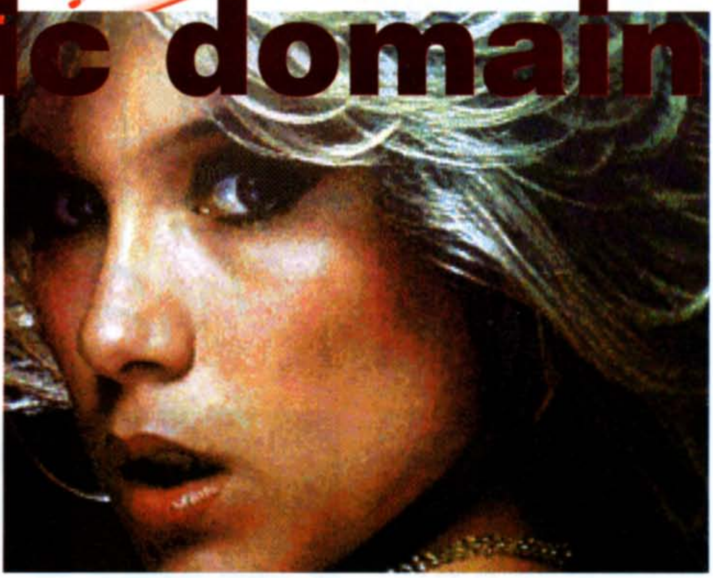
Best of all is a little thing called !ARMScroll produced by the soon-to-be famous *Brothers in ARM*. This is a stunning piece of work with high quality music, scrolling text and bouncing balls. I happen to know that this isn't their latest work – get hold of one if you can.

For utilities there's !DiscEdit, which is self-explanatory, !Stamp which puts the current date on a file and !Settype which let's you alter the file type. Both operate from the DeskTop – no need to press f12.

There are three dustbins – an idea borrowed from the Macintosh. Instead of using the delete option from the Filer menu you drag the file icon on to the dustbin icon. This now changes to a bloated bin to show there's something in it. And the file itself is copied into a trash directory.

The advantage is that you can examine what's been thrown out and get it back if you change your mind. There's an option on the dustbin icon bar menu to empty the trash. This irrevocably disposes of the files, so watch it!

Of the three bins available, the one called !Trash seems best. The icon has been borrowed from the Mac itself.



This stunning picture was ported from the Amiga and displayed using !Translator

Applications

In the area of application programs there's Outliner, a type of word processor which allows automatic indentation and various numbering schemes for paragraphs, sub-paras, sections and so on. It's not great, but it works.

In the really good category come !STracker and !Translatr. The former is an excellent multi-tasking music playing utility which you can program yourself. My version came with three sound tracks including a superb rendition of Axel-F.

Even more exciting was !Translatr which will convert ST, Amiga and MacPaint pictures into Archimedes sprite format.

However these two programs revealed one of the major difficulties with PD software – and that is compatibility. Both programs use the same types to distinguish their files, so the first one loaded loses out when the second is run and suddenly all your music files look like ST or Mac picture files.

A couple of games were also included, a fairly rough Fruit Machine and a version of the old favourite coordinate-based Star Trek, but with really nice graphics. But nobody's told them that in *The Next Generation* – the Klingons are our friends.

● Your appetite sufficiently whetted? Next month we'll take a look at the latest in graphics PD software

Into Pipe Mania

Dave Lawrence, its author, gives the game away

SUBSCRIBERS to *The Micro User* will find on this month's subscription disc a fully playable demo of the 8 bit version of the new Pipe Mania from Empire. It has all the features of the full game but with only one level. This is not actually one of the game levels but includes almost everything found in the game itself.

Pipe Mania starts on a playing grid empty except for a starting piece. The object is to score as many points as possible by constructing a continuous pipeline from this point.

As you play, pipe sections appear in a dispenser to the left of the grid. You can place a pipe section anywhere you like, whether or not it connects with other pipe sections. In fact, you'll learn to place pieces in a pattern that anticipates connections maybe five or ten moves in advance.

When the timer on the right reaches zero *flooz* will begin to flow out of the start piece down your pipeline. The level ends when the flooz reaches the end of the pipe. As the flooz flows, the distance indicator at the top of screen will decrease – once for each pipe section the flooz enters. When this reaches zero you qualify for the next round.

You are not restricted to making your pipeline exactly this length – making it longer earns double points – but if the level ends before the pipe is of the required length, your game is over.You can bomb a previously placed pipe section by placing a new one on top of it – but there's a short time delay for replacing pipes and a 50 point penalty. You cannot replace any pipes that are even partly filled with flooz.

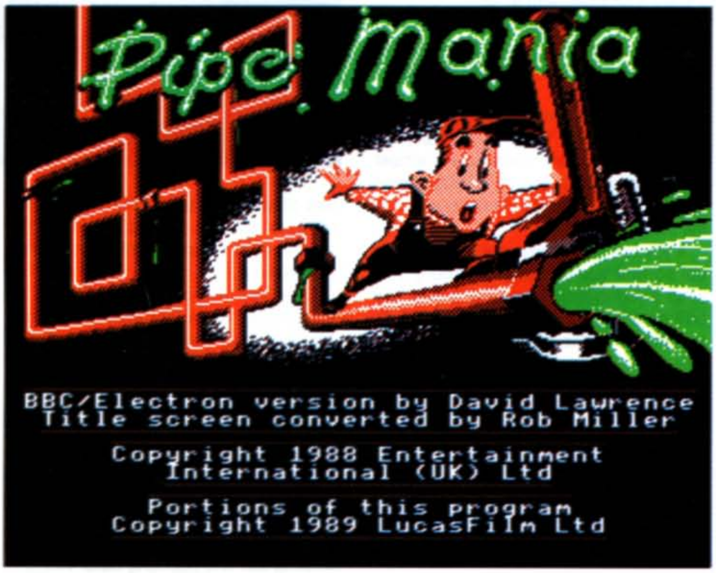
At the start of higher levels advanced pipe sections, such as bonus pipes, reservoirs, one-way pipes and end sections, will be randomly placed on the grid. These pieces also cannot be bombed.

Bonuses are also awarded for using the fixed sections and the reservoirs. The latter have the added advantage of slowing the flooz down, as they take a little while to fill them.

At the end of the level, you will incur a 100 point penalty for any pipe sections placed but not connected.

As there is only one level, the game will always end when the flooz reaches the end of the pipeline. Once you've placed all the pipe sections you can or want to, pressing the fast key will speed the flooz up and end the level quickly. This will immediately score you double points, regardless of the length of the pipe.

This version of Pipe Mania will work on the latest version of !165 Host on the Archimedes.



BBC/Electron version by David Lawrence
Title screen converted by Rob Miller

Copyright 1988 Entertainment
International (UK) Ltd

Portions of this program
Copyright 1989 LucasFilm Ltd

The playing modes

Basic: A one player mode with a single pipe dispenser on the the left of the screen.

Two player: A competitive mode with two pipe dispensers. Player One uses the top and Player Two the other. The players must work together to build the pipe, but score individually for their own sections.

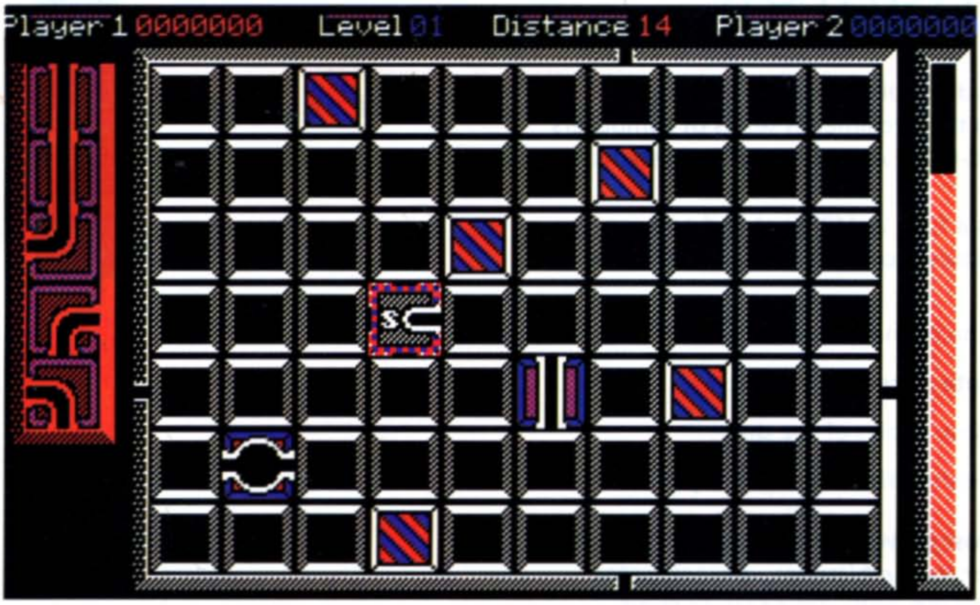
Expert: One player mode, but uses both pipe dispensers. Pipe sections can be placed from either dispenser with the advantage of scoring double points if pipes are laid in alternate colours.

Two playing speeds are also available, normal and training. In training mode, you are allowed twice as much time before the flooz starts, but you only score half as many points.

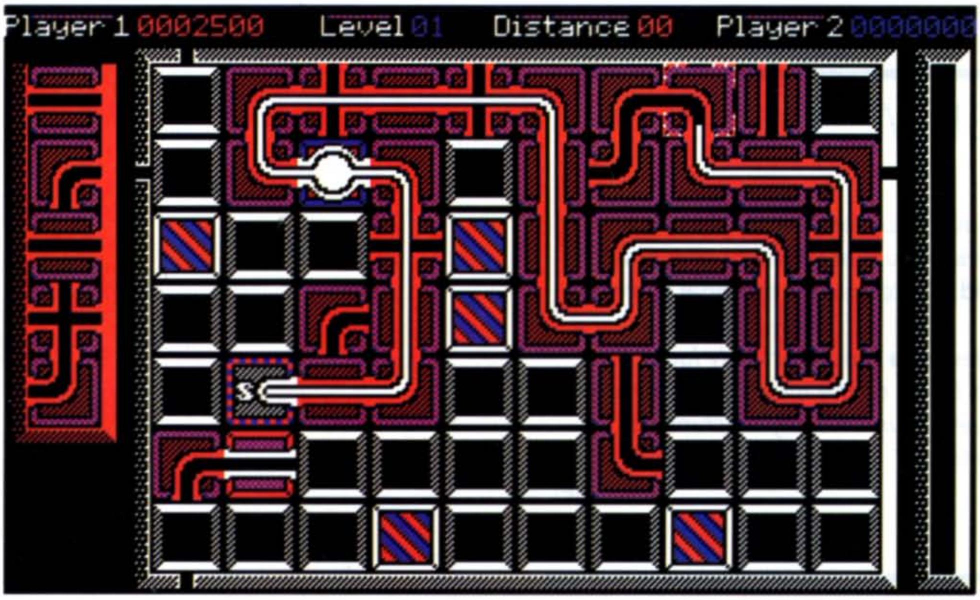
Game keys

Action	Single	Player 1	Player 2
Left	Z	Z	,
Right	X	X	.
Down	/	C	/
Up	:	F	:
Lay pipe	Return	Shift	Return
Pause game	P	Blanks the screen – press any key to unpause.	
Fast flooz	Tab	Speeds up the flooz and scores double points.	
Quit game	Shift+Escape		

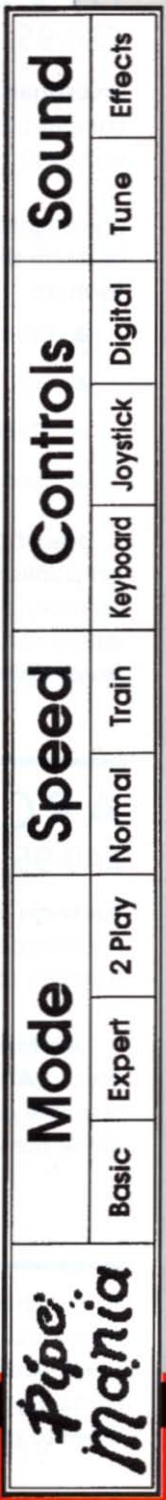
The single player game keys are used in both one-player modes and in two-player mode if a joystick is being used.


Player 1 0000000
Level 01
Distance 14
Player 2 0000000

Ready to start


Player 1 0002500
Level 01
Distance 00
Player 2 0000000

Nearing the end of the pipe


Pipe Mania
Mode
Basic
Expert
2 Play
Speed
Normal
Train
Controls
Keyboard
Joystick
Digital
Sound
Tune
Effects

How to get Pipe-Mania

The full version of Pipe Mania is available from:

Empire, Unit 4 Stannetts,
Laindon North Trade Centre,
Basildon, Essex SS15 6DG.
Tel: 0268 541126

£14.99 (disc 3.5/5.25)
£9.99 (tape)
£24.99 (Archimedes 3.5)

Function keys

The function key strip on this page shows the use of the keys which control most of the features on the title screen.

In two-player mode, controls for each player are selected by pressing 1 and 2 in conjunction with f5, f6 or f7.

The two sound control keys act as both on/off toggle controls and volume adjustment. Pressing the key briefly will toggle the relevant sound between full volume and silent.

Holding down the key for more than about half a second will gradually increase or decrease the volume. These are also active during game play. The Digital control option is designed for a Master Compact fitted with a switched – Atari style – joystick only.

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More joy for your mouse

Mike Cook builds a joystick converter to supercharge a 32 bit games machine

THE Archimedes were not the first micros to use a mouse, indeed the AMX mouse was one of the better commercial enhancements you could have on the old BBC B. However, what could even the first model B use that is missing on the Archimedes? The answer is a joystick.

This is OK when the mouse is for handling the desktop, drawing and achieving fine control. But when faced with a mass of marauding invaders and you are down to your last spaceship, nothing quite beats a joystick. So this month let's see how to add one to the Archimedes series or a BBC A3000.

You can add a joystick directly to the 310 or 400 series by using the analogue input port on Acorn's I/O podule. But no commercial games recognise one in this position. Most games do, however, make use of the mouse, so a successful strategy would be to make the micro think the joystick is a mouse. In order to perform this subterfuge we will have to design some interfacing circuitry.

First, let's look at the signals the mouse sends: There are two similar pairs, one for both the X and Y directions. Figure I shows one pair. Whenever the mouse is moved the reference signal produces a square wave. The second or direction signal is also a square wave. However, it is 90 degrees out of phase with the reference.

Now depending upon the direction of movement, it is either 90 degrees leading or lagging the reference signal. So the operating system can not only tell the mouse has moved but also which way. The mouse's mechanical arrangement is shown in Figure II. You can see how these out-of-phase signals are naturally produced by the alignment of the optical slot detectors. Now let's consider a joystick. We will talk about the switched type here, but the argument applies equally well to a proportional one. When centered, the joystick produces a voltage that is half the reference voltage being fed to it. When the stick is moved this changes to zero volts or the full reference voltage, depending on the direction of movement.

On the face of it, the signals from the joystick look totally different to those needed from the mouse, but here's the plan: First we will use an analogue to digital converter to sort out in which direction the joystick is pointing, and then use that signal to let through pulses from a two phase clock circuit using one of the digital outputs to determine the phase of the second signal.

The circuit is shown in Figure III, and takes in all five ICs. IC1 is a 74LS13 and is wired up as a clock oscillator. This determines the speed of signals sent to the micro and, as a result, the speed of pointer

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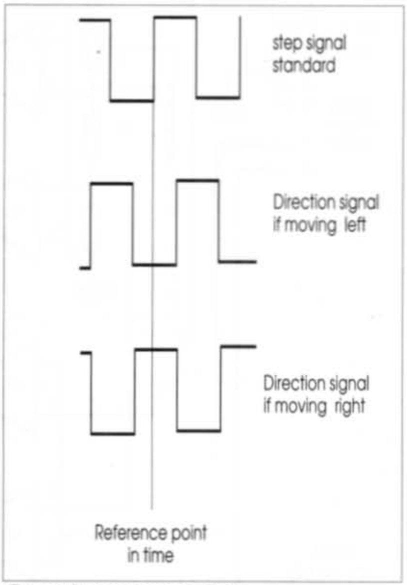
step signal standard
Direction signal if moving left
Direction signal if moving right
Reference point in time

Figure I: Signals the mouse sends

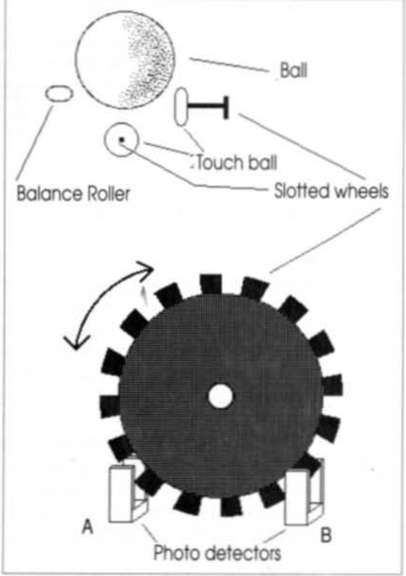

Figure II: Operating principle of a mouse

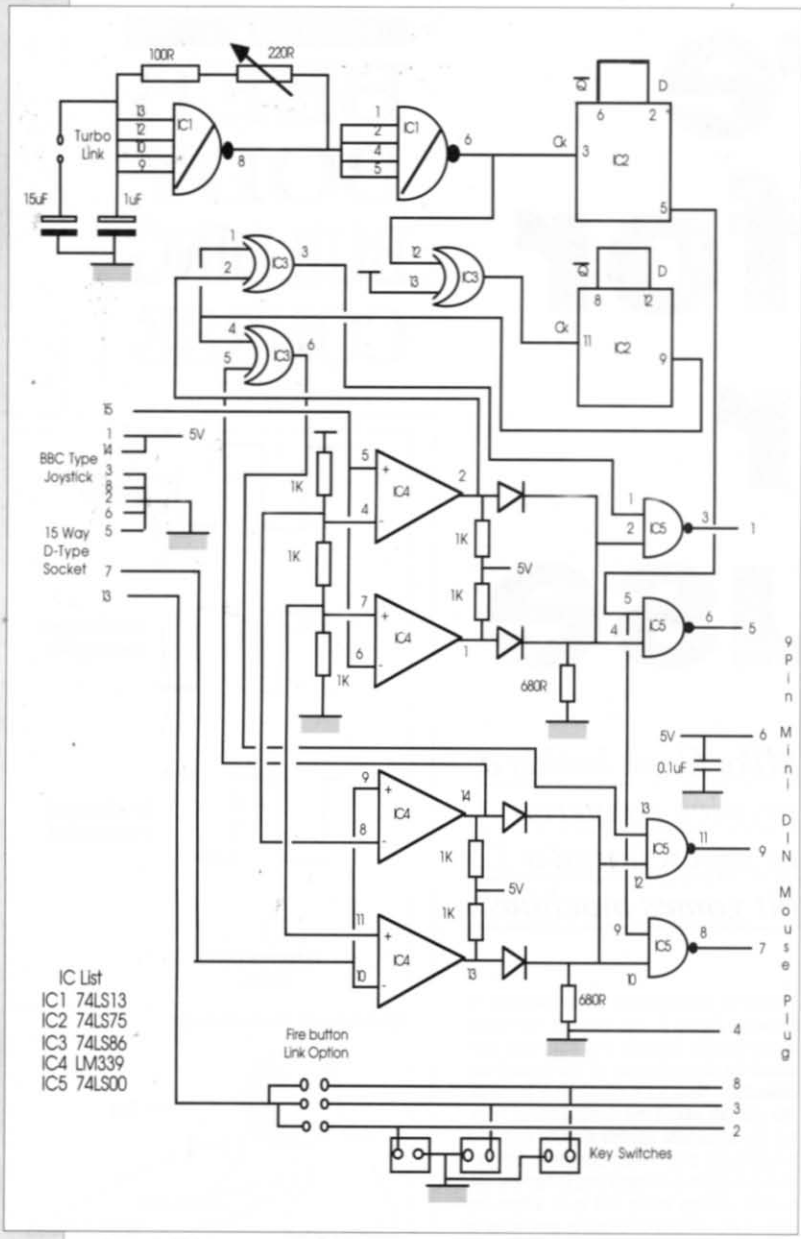

Figure III: BBC joystick converter

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movement. This can be adjusted by the variable resistor or by removing a link – so you could go from normal desktop handling speed to supercharged mode for games. You can attach the two pins of the link to a switch to make the change over more convenient.

The clock output then drives two D-Type flip-flops wired up in a divide-by-two configuration. However, one is fed with the inverse of the clock signal – using a spare gate from another package – thus triggering it on the positive edge of the clock instead of the falling edge. This means that the signals emerging will be 90 degrees out of phase with each other.

Now we take one of the signals and apply it to an Exclusive OR gate. This will let the signal through or invert it, depending upon the other gate input.

Another way of describing inverting a signal is to say it is phase shifted by 180 degrees, so moving the signal from being 90 degrees leading to 90 degrees lagging. Incidentally, 270 degrees leading is just the same as saying 90 degrees lagging. We need to use two Exclusive OR gates because we have to deal with two direction signals, horizontal and vertical.

Next let's look at the joystick side. If we feed the joystick reference with five volts we will get a joystick voltage that sits at 2.5 volts and goes to 5 volts and earth. Because of the limited range of voltages we need to differentiate, we only need a very simple analogue to digital converter.

This is achieved by using two comparators and as the LM339 contains four of them we can make both A/Ds with the one chip.

To see how it works consider the two comparators in the middle of Figure III. When the voltage across the + and - inputs of a comparator is positive it will output a logic 1. Conversely, when it is negative it will output a voltage zero.

One axis of the joystick is connected to pins 5 and 6, that is the positive and negative inputs of two comparators. The other inputs are connected to taps in a resistor chain. Across each resistor in this chain is one third of the supply voltage, so that on pin 7 we have about 1.6 volts. This is much lower than the negative input and so the output of this comparator is at zero. When the joystick moves to give 5 volts, it is still lower and so there is no change in the output. Only when pin 6 moves to zero volts is there a positive voltage across the inputs and the comparator moves to a logic one.

The reverse argument applies to the other comparator. Normally it produces a zero because pin 4 is much higher than the joystick voltage, no change occurs when this goes down to zero volts. Only as it goes to 5 volts does the comparator have a positive voltage across it and its output goes to a logic one. Therefore, normally both comparators are at zero and move to a one when the joystick is moved.

We can use one of these comparators to provide the signal into IC3 to change the phase of the clock signal. Now we also want to let the phased signals be sent to the micro when either comparator is at a logic one.

I could have used an OR gate here, but all the gates in the package would not have been used, so for economy I used diodes to mix the two comparator outputs together.

This requires the use of a 680Ω pull-down resistor to make sure that normally there will be a logic zero at the inputs to the pass gates of IC5. Note also that the comparators have open collector outputs, and so need a 1k pull-up resistor.

Finally, the mouse has three buttons while a joystick has only one. So I have included on the interface board three key switches to act as mouse buttons.

In addition you can make a link to enable the joystick button to be used as any one of the three mouse buttons. This means that you can use one hand for the joystick and the other for the buttons, and still use the joystick fire button for the most used function.

Construction is not very critical, and can be made on veroboard as was my prototype. However, as I anticipate that this will be a popular addition I have made a printed circuit board to accommodate it. The joystick plugs into a PCB mounting socket and a flying lead goes to a 9 pin mini-DIN plug which plugs into the Archimedes keyboard in place of the mouse. The board along with all the components can be ordered as Body Build Pack number 59 – see the coupon at the end of the article for details.

The BBC Micro-type joystick is not always the cheapest, although if you have moved up to an Archimedes from the earlier machines it is the type you are most likely to have. The expense arises because they are designed to feed into an analogue input port. It is much cheaper to make a joystick to feed into a digital input.

This means that you have to have four signals – up, down, left and right – as opposed to just horizontal and vertical, but the internal design is simpler. This type of joystick is often known as an Atari type. If you are thinking of buying a joystick to use in place of the mouse you might consider one of these.

It turns out that it is also easier to generate mouse-like signals from the Atari 9 pin type of joystick. The circuit is shown in Figure IV.

The major change here is that instead of using it in the more familar common earth configuration, the common signal is 5 volts. So each signal out of the joystick produces 5 volts when being pushed, otherwise it is a high impedence or open circuit.

This means that we have to tie down each input to the pass gates (IC4) with 680Ω pull-down resistors so that they normally give a logic zero. We can simply tie the left and right signals together. However, we need a diode in one line to make sure that the phase shift gate is only switched by one direction signal. This is because a diode will only allow the signal to flow in one direction. One slight complication with using a common 5 volts as opposed to a common earth is that the signal from the fire button is upside down.

Fortunately we can use a spare gate from IC3 to invert it. However, note that pressing the key switch linked to the fire button will short the output of this gate to earth.

Don't worry about this as these gates are designed to withstand a permanent short circuit on their output.

This trick of changing a common earth to a common 5 volts will only work with a passive switch joystick – which covers nearly all of them. But it won't with a trackball in joystick mode, nor the sort that has a pulse generator to simulate rapid pressing of the fire button.

In the latter case the direction control will work, but the fire button will not and you will have to relay on the switches on the interface board. Because the circuit is so different I have laid out another printed circuit board, available as Body Building Pack number 60.

So there you have it. You can now swap your mouse for a turbo-charged joystick. I'll now see how that improves my chances against the alien invaders. See you next month – if I survive.

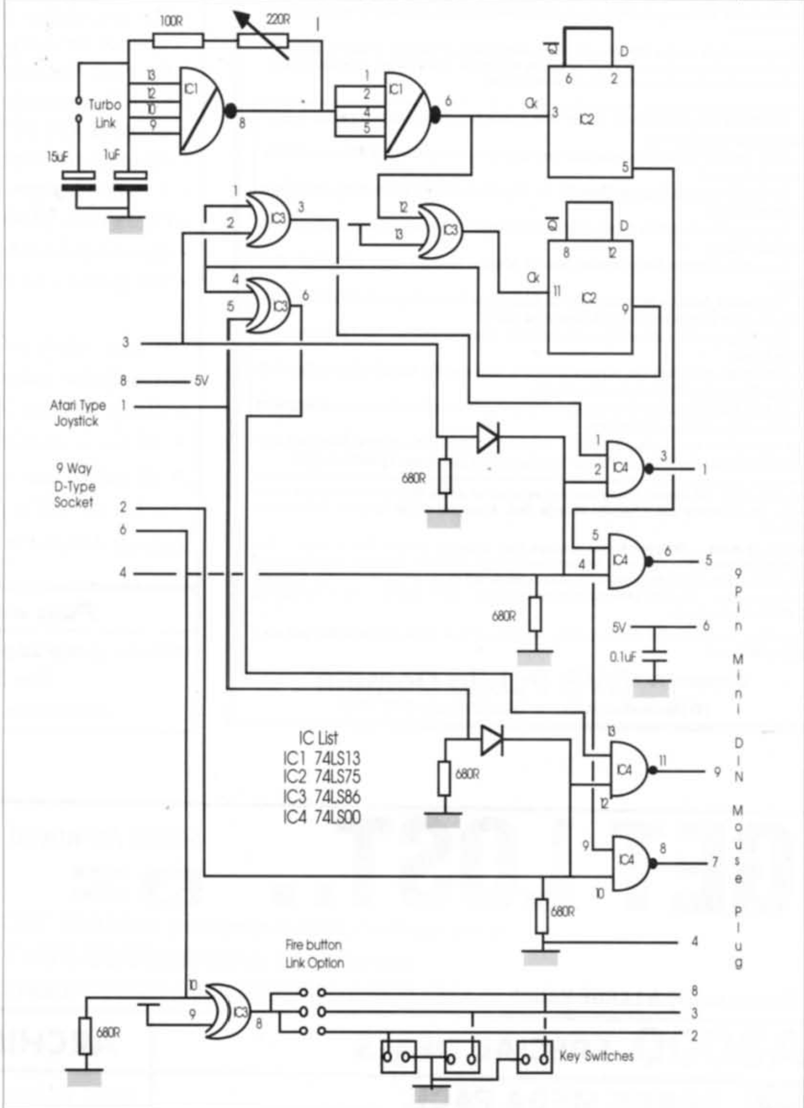

Figure IV: Atari type joystick convertor

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IF you own or have used an Archimedes, think back to how you felt when you first switched it on and sat down in front of the now-familiar DeskTop. Were you excited by the power at your command? Apprehensive? Bewildered? Maybe you had read all the right articles and considered yourself an expert, or perhaps this was your first tremulous encounter with a micro of any kind.

The Archimedes is designed as a pretty friendly beast – just point and click. But for all that, at some stage you are still going to be stuck with finding your way around the workings of some software with the help – or otherwise – of the manual.

That can be bad enough, but what if the Archimedes isn't yours, you're acting under orders and you feel tyrannised by the machine to start with? A sort of paralysis can set in, leading to frustration and hostility. It's not necessarily that the manuals are bad, you just have too much to look at and understand at once.

To the rescue comes Headline, with its first Reel-Time course for the Archimedes on Risc OS and Acorn DTP. It consists of three audio cassettes and a training disc containing demonstration samples and files, a memory optimisation utility – useful for a 1Mb machine – and an Electric Book, which is an edited transcript of the whole course for revision purposes.

The principle, which though not new is still valid, is that of multi-channel education. You are given information by one channel – your ears – and get positive feedback from your fingers on the mouse and keyboard as you see the effect of your actions. It's quite a rewarding way of learning.

As I already have an inkling of Risc OS operation, my long-suffering but Archimedes-naive wife volunteered to try out the first course without help from me.

Product: Complete Introduction to Acorn Desktop Publisher and Risc OS
Price: £49.95+VAT
Supplier: Headline Communication Ltd, P.O. Box 22, Hereford HR4 8UW
Tel: 0432 271598
Requirements: Archimedes series with Risc OS or A3000, Acorn DTP, cassette player

After working through the first side of the tape once and the second twice she concluded that she had gained enough confidence and insight to feel at ease with the basics of DeskTop work – mouse, discs, formatting, backups, filer, directories, multitasking and the !Draw and !Edit applications.

No small achievement. Relieved, I moved on to the four Acorn DTP sessions. It's rather like having your own personal tutor at your shoulder – an infinitely patient one, because you can replay a section as often as you like if you miss something or don't understand a phrase. No recriminations, no criticism.

It's all very reassuring if you're nervous, without being patronising if you're not.

The course starts by comparing DTP with word processing. Emphasis is correctly laid on the need for a basic understanding of typography and page design.

Sound advice is given, such as the desirability of preparing a rough layout before turning the micro on. It's easy to forget that creativity doesn't reside in the technology but in the individual. Of course the beauty of DTP lies in experimenting on and fine tuning your original ideas.

By building up a replica of a news sheet provided, you are introduced to new concepts, gradually at first – frame mode, importing text, point sizes, leading, changing attributes in text and paragraph modes and setting up styles.

As you become more proficient the pace is quickened and more advanced concepts are introduced, such as dropped capitals, special characters, hyphenation and justification, hyphens and dashes, kerning, ligatures, importing tabular text and including images.

Copy-fitting – making text fit the space available – is covered and you are reminded of the editor's prerogative to cut other people's work ruthlessly.

Running through the sessions there is an open-ended mini-project involving designing your own advertisement for the course. By this time you are sold on it anyway.

The tapes don't replace the manual altogether and aren't intended to. What they do – successfully – is tell you what you need to know to get started and encourage you to build on this.

The Electric Book idea, where you have a set of Draw files that you can flick through to revise passages, does save hunting through the tapes for an elusive passage.

I suspect that the price will deter purchase by individual or casual users of Acorn DTP. Any schools fortunate enough to have the software could consider buying it, but I see the main application as being in business where it will be ideal for training employees, to get over the initial hurdle of practical experience.

So let's hope that businesses will begin to take the Archimedes seriously now that businesslike software is emerging.

Summing up

There won't yet be competition with my wife for the use of the domestic Archimedes, but the Risc OS course has brought the day a little closer. With any luck the Acorn DTP course will do the same for the Archimedes in heavier duty situations.

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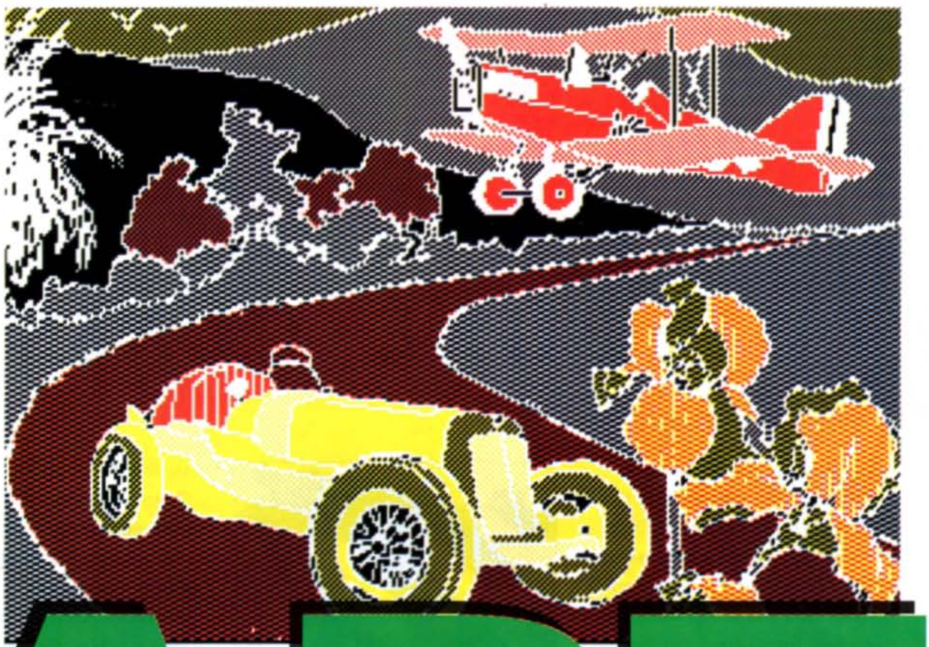


ART in two modes

Bruce Goatly draws his own conclusions about a graphics package

Product: Illustrator-Colourbox
Price: £29.90; with Digimouse £59.90; Mouse alone £37.50.
Supplier: Nidd Valley Micro Products Ltd, Thistle Hill, Knaresborough, N. Yorks, HG5 8JW
Tel: 0423 866375
Requirements: Model B, B+ or Master 128

ILLUSTRATOR-Colourbox is really a conjunction of two graphics programs with different aims. Illustrator was intended in the first instance for drawing pictures which could then be included in text printed from a word processor. Colourbox will let you colour designs prepared with Illustrator or you can use it for making your own coloured drawings from scratch.

The software comes on three 40 track discs – two for Illustrator and one for Colourbox – and two manuals with keystrips in coordinated colours.

The optional three-button Digimouse is in Acorn cream and has an extra sliding switch – the *linear lock* – conveniently placed for the thumb.

Illustrator operates in Mode 4 and is

entirely menu driven, with both drop-down and pop-up menus. There are two main menus at the top of the screen, toggled by clicking on a small symbol – an icon – close by, giving access to eight main options.

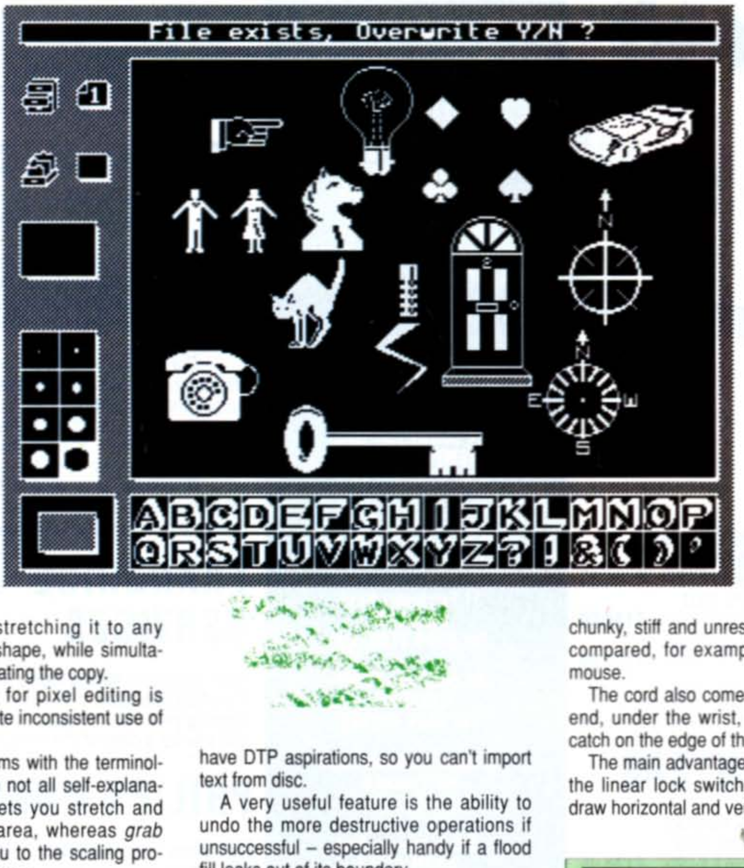
> **“A very useful feature is the ability to undo the more destructive operations if unsuccessful – especially handy if a flood fill leaks out of its boundary”**

There are other menus for loading and saving pictures, patterns and brushes, and for extensions like flood filling, cutting/pasting and printing.

The range of menu options is quite bewildering at first, but trial and error – or studying the manual – is a good teacher.

All the expected drawing functions are there, such as lines, rays, circles, rectangles and some polygons, with various fill options and the ability to mix fills and copies in different ways with AND, OR and EOR.

The spray function is really only a draw, in that there is no concept of a mask or random scatter of dots.



```
File exists, Overwrite Y/N ?
```

There is a bank of eight brushes to choose from, and you can define your own.

The scaling and rotating of shapes, achieved with the function keys, is a bit coarse.

I found regular curves in particular hard to draw – they always needed subsequent trimming at the ends.

The cutting and pasting commands are versatile.

You can select an area of a picture from disc or from the one you are working on, and you can scale the copied area either by exact proportions or by stretching it to any desired rectangular shape, while simultaneously flipping or rotating the copy.

The zoom option for pixel editing is quick and easy, despite inconsistent use of mouse buttons.

I had some problems with the terminology used, which was not all self-explanatory: *grab and cut* lets you stretch and squash the copied area, whereas *grab and copy* restricts you to the scaling provided by the function keys.

There is also no simple way of moving an area within a picture – you have to copy it first then rub out the original.

You can incorporate text in your picture, both in heading style – nine fonts are supplied on disc, and you can design more of your own – and by typing at the keyboard, which is possible in six styles of differing weights and slope.

Using the disc-based alphabets is a bit like applying instant lettering, being a letter at a time and rather slow. Illustrator doesn't have DTP aspirations, so you can't import text from disc.

A very useful feature is the ability to undo the more destructive operations if unsuccessful – especially handy if a flood fill leaks out of its boundary.

There are 32 fill patterns on screen to choose from and, again, these are definable.

The print option is interesting because you can place your illustration in one of several sizes – the largest is about half a page – at an exact position on your page, which means you can print out your text from your word processor leaving suitable holes, then reposition the paper to print the pictures one at a time.

The appearance of the largest size is rather blocky.

Colourbox takes over where Illustrator leaves off, with a utility to convert a Mode 4 screen to the Colourbox's Mode 1 and then load it ready for colouring.

Some of Illustrator's facilities are duplicated and there is a similar menu philosophy, but now you can perm any four colours from eight and mix new colours by shading.

A useful extra facility is to be able to toggle between fast and slow mouse action with the left button, so you can get to menus quickly but still draw accurately.

As with Illustrator, the function keys are used for other options, this time to do with scaling and rotating an area being copied. Unhappily the copy function is not intelligent, so if the areas overlap you may get a surprise and there's no *undo* option.

Earlier versions had an Autosave facility so you could never lose more than 10 minutes' work, but this has now been removed owing to shortage of memory.

Painting and spraying give you plenty of different shades and colour mixes to choose from and there is a zoom option for tidying things up.

You can also print out your creations, either in monochrome or, if you have a Star LC10 or an Integrex Colourjet, in colour.

It may be I've been spoiled by the Archimedes, but I found the Digimouse rather chunky, stiff and unresponsive even when compared, for example, with the Quest mouse.

The cord also comes out of the "wrong" end, under the wrist, which causes it to catch on the edge of the work surface.

The main advantage of the Digimouse is the linear lock switch, making it easy to draw horizontal and vertical lines.

Summing up

Illustrator is an inexpensive but neat solution if you don't want to lash out on a DTP package.

Colourbox is simple and well designed for drawing and colouring Mode 1 screens.

Together they form a fairly comprehensive art package. The manuals are well written and generally easy to follow.

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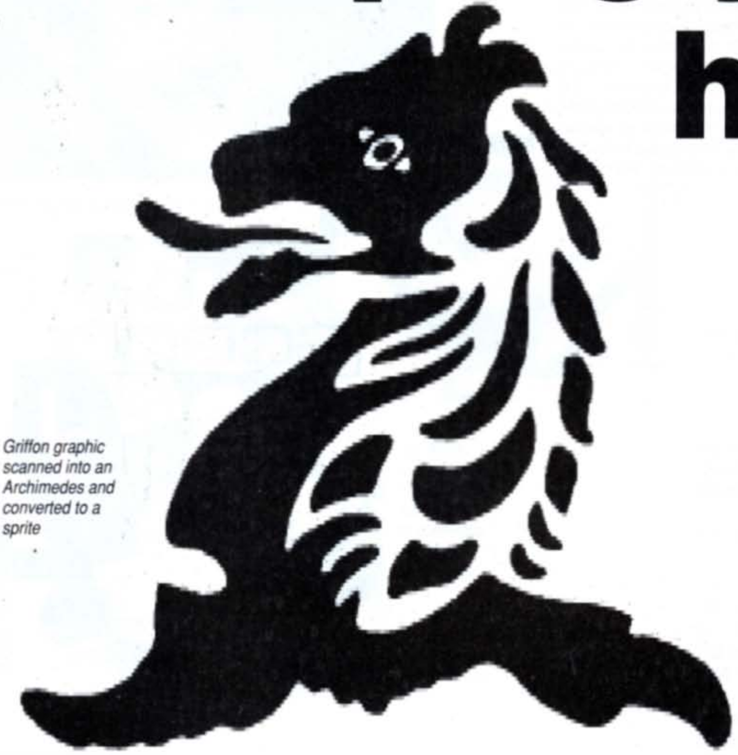


Griffon graphic scanned into an Archimedes and converted to a sprite

Martin Shields dons an artist's smock – with the help of a new hand scanner

WHEN it come to producing a professional looking output from one of the many powerful desktop publishing packages around text is no great problem, but the pictures are a different matter. It takes a skilled artist a great deal of time to be able to create pictures worthy of publishing using a drawing package like !Draw or !Paint.

So this is where a scanner can save the day. This device converts a picture into a digital representation which can then be imported into your DTP program.

Watford's model comes with a half width expansion card, 1.8 metres of cable and a 20 page A5 instruction booklet. Fitting is easy providing that you have a backplane with a free slot.

The scanner unit plugs into the rear of this backplane and I found the cable supplied more than adequate for scanning on my desk or on a nearby table.

When the micro is switched on you may briefly see *Watford Electronics Scanner* after the usual start up messages and on the desktop is a scanner icon next to the disc drive at the left hand side of the icon bar. The scanner always takes a default of 48k, though you can disable it if you wish to free the memory.

Product: Archi Hand Scanner MkII
Price: £149
Product: Beeb Handscan
Price: £139
Supplier: Watford Electronics, Jessa House, 250 Lower High Street, Watford WD1 2AN
Tel: 0923 37774

Scanning an image is simple. Select on the scanner icon brings up a small Scan buffer size menu where you can set the maximum area you are to scan and the required resolution. The area to be scanned is selected with arrows or by typing into dialogue boxes, while the resolution – 100, 200, 300 or 400 dots per inch – is selected with a switch on the side of the scanner.

High resolution gives improved picture quality, but takes up a vast amount of memory. For example. Assume that you wanted to scan something at the maximum width of the scanner (105mm) with a maximum length of 296mm, which is approximately the full length and half the width of an A4 page, it would take:

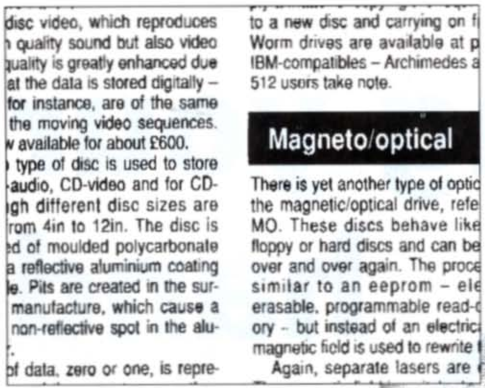
dpi	Memory (k)
100	59
200	237
300	534
400	950

Next the scanning window appears and the scanner emits a green light which makes it easy to line it up with your picture. All you do is slowly drag the unit along the paper, while holding down the start button under your thumb.

As you scan, the image appears in a window on the screen. I found this a fairly easy operation and was soon using it confidently. The higher the resolution, the slower you must scan the image and a warning light on the scanner flashes when you reach the speed limit and goes out if you exceed it, indicating that you may have missed some horizontal lines.

Occasionally it may be necessary to rescan the material with a different contrast. There are two adjustments possible via

➤



disc video, which reproduces
ı quality sound but also video
quality is greatly enhanced due
at the data is stored digitally –
for instance, are of the same
the moving video sequences.
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audio, CD-video and for CD-
gh different disc sizes are
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a reflective aluminium coating
e. Pits are created in the sur-
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of data, zero or one, is repre-

to a new disc and carrying on f
Worm drives are available at p
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512 users take note.

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There is yet another type of optic
the magnetic/optical drive, refe
MO. These discs behave like
floppy or hard discs and can be
over and over again. The proce
similar to an eeprom – ele
erasable, programmable read-
ory – but instead of an electric
magnetic field is used to rewrite
Again, separate lasers are

Even with just the 8 bit version it's like having a photocopier at home

Good results from a colour photograph

➤ either a four position switch or a thumbwheel, both located on the left hand side of the scanner.

The switch lets you select between three grey scales or text – which gives excellent results on pure black and white images where no shades are involved. Within any setting, the contrast can be adjusted using the thumb-wheel.

Several processes can be applied to the scanned image. You can zoom in or out, specifying the x and y coordinates separately if you wish, or set the overall scale. A useful option off the main menu is Process. This allows X and Y flips, and two other utilities intended to improve your image, edge and copy.

Edge replaces the image with one that shows only the outline. Copy allows you to copy every pixel on the image in a certain direction – if you copied a thin, horizontal line upwards the line's width would increase. I found this only useful on poor quality objects.

I was disappointed at the lack of an undo, which can mean if you use the edge detection before saving you can lose your original.

The Save sprite option offers the opportunity to anti-alias the image – quite the best feature of the entire package.

If you have an image and want it saving in a certain size, instead of just removing pixels until the correct size is reached it looks at the local group of pixels, chooses an intermediate grey level and leaves one pixel with this level.

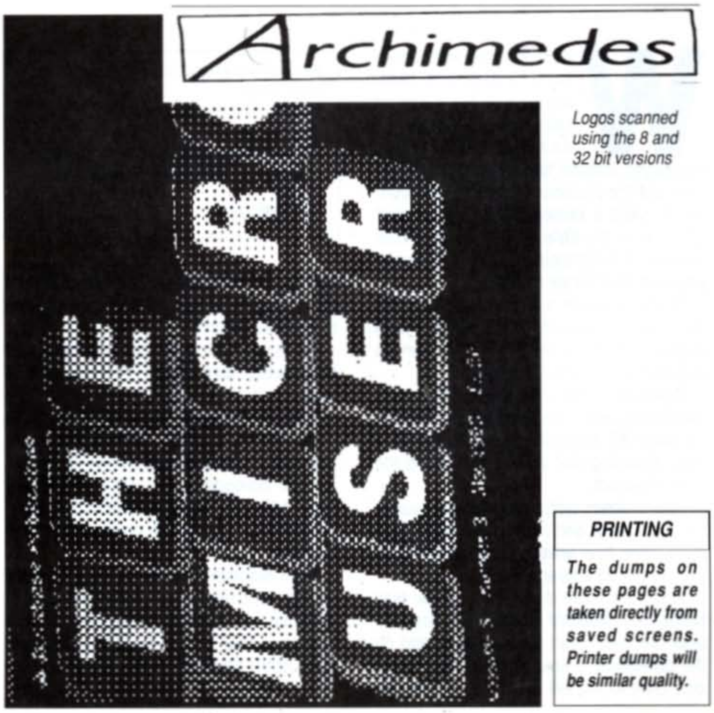
This greatly improves the image's quality. The only fault is that Watford has not included a method of anti-aliasing it and then showing you this image, though this can be achieved by loading it into Paint or another art package.

A detailed description of anti-aliasing is given in the manual, but it makes rather heavy reading.

As the illustrations reproduced here show, the scanner can give very good results and is certainly a worthwhile investment ■

fun
school
2

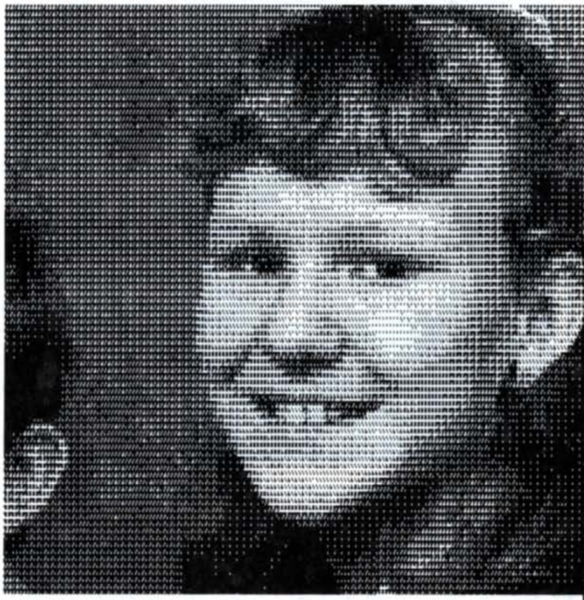
A 200 dpi image over a 100 dpi one shows the difference in quality on 8 bit scans



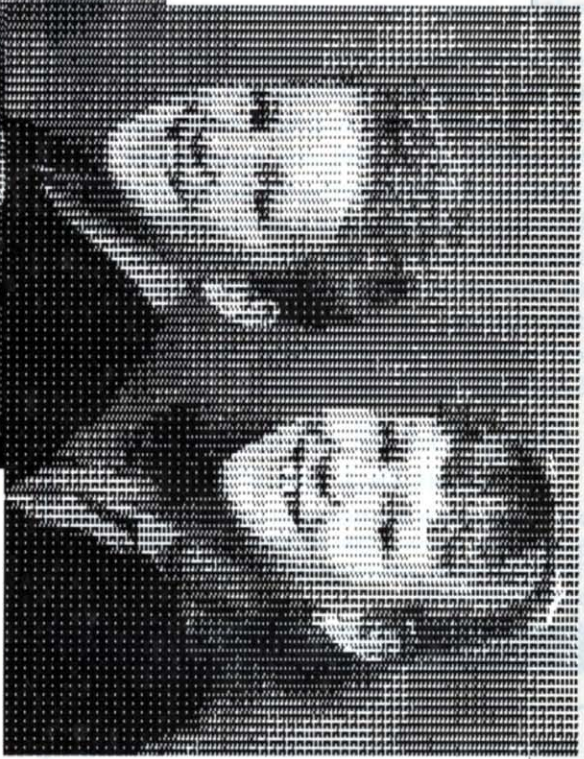
Logos scanned using the 8 and 32 bit versions

PRINTING

The dumps on these pages are taken directly from saved screens. Printer dumps will be similar quality.



The 8 bit micro gives quite a clear image at 200dpi



The whole photograph can be scanned at once using the 100dpi option

Summing up

An invaluable aid to anyone serious about DTP work, whatever the finished product is to be, and good value for money at less than £180.

For 8 bits too

THE Archie Hand Scanner is a great piece of equipment for the Archimedes range, but owmers of 8 bit machines have not been forgotten by Watford Electronics. The same scanner with different interface is available for their micro.

The scanner plugs into a small box which in turn plugs into the 1MHz bus. Another lead connects to the micro's power supply and, another socket is provided on the lead to power a disc drive.

The software comes on rom and to scan a picture all you have to do is enter:

```
*SCAN
```

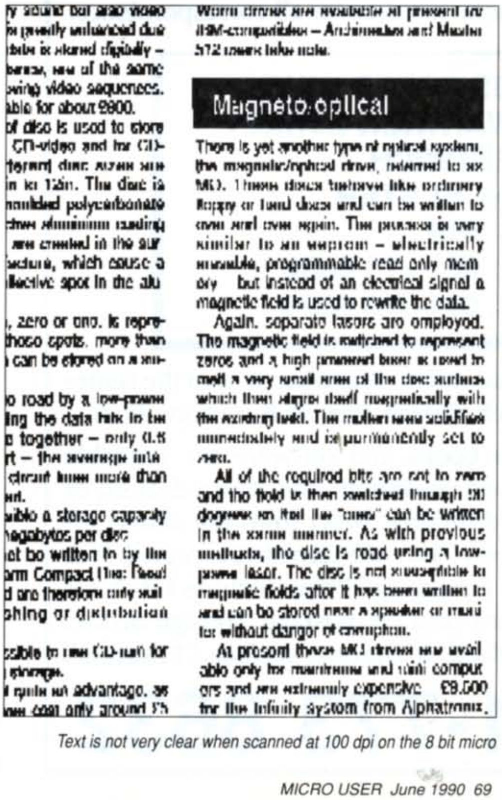
This is adequate just to capture a picture, and a short program to detect a key press and take the appropriate action – scan, save or print – can easily be written. However, pictures have to be loaded into other software to manipulate images.

Probably the best way to use the scanner is in conjunction with Wapping Editor, when it can be accessed directly from a menu. Note that a few early versions of Wapping Editor did not support the scanner, so if it doesn't behave exactly as expected you may have an old copy – contact Watford Electronics for upgrade details.

Images are scanned on Mode 0 and you can only use 100 or 200 DPI. For the latter, only a vertical half the screen is used.

The results may not be as impressive as those from a 32 bit micro, but are nonetheless very good. The 8 bit BBC micro can hardly be described as a DTP machine, but Wapping Editor gives it a fighting chance used with this scanner.

Used alone or with another software package, the scanner is fun and gives excellent results. It's almost like having a photocopier at home.



Text is not very clear when scanned at 100 dpi on the 8 bit micro

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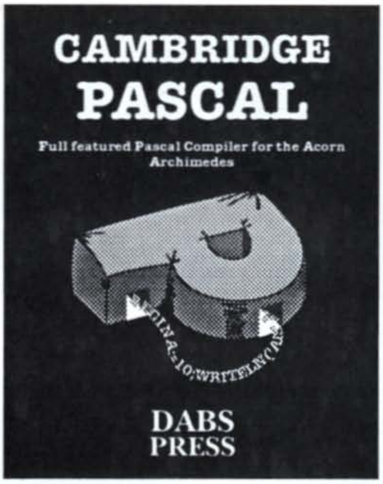

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Questions within Questions

The Mad Hatter explains how you can help him to help you

READER Stuart Burrows has been snarled up in one or two classic adventures and so, as well as sending him answers direct – he enclosed an sae with his letter of inquiry – I am including the tips here, because his letter shows the kind of questions I can – and can't – deal with.

His first query has to do with **Hampstead** and looks straightforward: *What is the exact input needed to buy the cottage? (I have the credit card, job, car and so-on).*

In fact, Stuart has overlooked quite a considerable number of things which are needed to acquire the cottage. First and foremost, he doesn't mention having the draft for £100,000 – and that is crucial to the solution of the cottage puzzle.

That means, in all probability, Stuart hasn't prised open the filing cabinet in his office at the bank, using the screwdriver obtained in the department store.

So what looks a simple question involving a parser problem turns out to be something quite different – a missing link in quite a long chaining puzzle. My advice to Stuart stopped short here, as I don't want to spoil his fun.

Next query had to do with **Sorceror of Claymorgue Castle** an old style two-word input adventure. Stuart writes:*I have gone to the chandelier and cast the light-squared spell as instructed, but it fails. Do I need anything special before casting it?*

My problem here is twofold: Firstly, I am dependent upon a reader (Ian Weston) for the solution – which is given as a list of input instructions without any comment. Secondly, you will have noticed that Stuart doesn't tell me what he is carrying, so even if I had been given a commentary with Ian's solution, I'm no better off in trying to help Stuart.

Ian's solution for the relevant section of the adventure reads *go chandelier, cast light-squared spell, get star* and continues with no hint of a failure. However, at the very end of his solution he makes one comment: Due to some of the random elements in the game, parts of the adventure must be saved on tape beforehand.

So my suggestion to Stuart is simply: *Retrace your steps, save the game before casting the spell and see what happens.*

This makes the point as well as anything could that it is essential to save your position in an adventure at regular intervals. My own policy is pretty straightforward. I always save before attempting something dangerous, or before doing something I suspect involves a random element.

I also save at regular intervals anyway, because I can't think of anything more frustrating than getting halfway through an adventure only to discover I did something wrong about 30 moves previously and that I must go back to the very beginning. So I save regularly to disc even if a ram-save facility is available with the adventure.

Stuart's third request involved that stunning adventure **Village of Lost Souls** which happens to be one of my all-time favourites. He asks: *What is the input needed to light the candle, pipe and so on? Also where are the heavy veil, gloves and the cabbage patch?*

I'd like to make one or two general comments before dealing with the specific requests here. **Village of Lost Souls** provides a large, complex and fairly open scenario. There aren't all that many locations where you are forced to solve puzzles before you can enter them.

The most important preliminary technique, therefore, is to explore steadily and systematically, noting down every single location on your map. You should also make notes on what you find – and where – and what happens when you try to manipulate objects, examine things and search around.

As you explore, you will gradually build up a great deal of useful information and the facets of various puzzles will begin to suggest themselves to you, together with possible solutions.

Only when you are absolutely sure that you really have been everywhere available to you in this initial stage should you start the process of problem solving. You'll probably have a list of locked doors, unreachable objects and the like which will indicate where future explorations lie.

Now to specifics: The early part of **Lost Souls** involved dealing with two quick problems that provided a nuisance – the dogs and the thieving bird. The dogs have a taste for ham and the bird problem could be solved by archery. The ham, bow and arrow are all in different locations but no problem solving is required – only painstaking exploration. And the funny thing is that the heavy veil mentioned by Stuart is in the same place as the arrow.

The next significant chaining puzzle involves learning how to open the door to the gatehouse of the Manor because that is where the gloves Stuart mentions are to be found – and the cabbage patch too.

I won't bother dealing with this in any detail – there is no point – since Stuart has far too much to do. I'll just say that he will first need to do a blacksmith's work and then some farmwork. So in answer to his very first query – how to light things – I'll simply state that a staff can be found which, if used appropriately, will turn out to be a significant source of ignition.

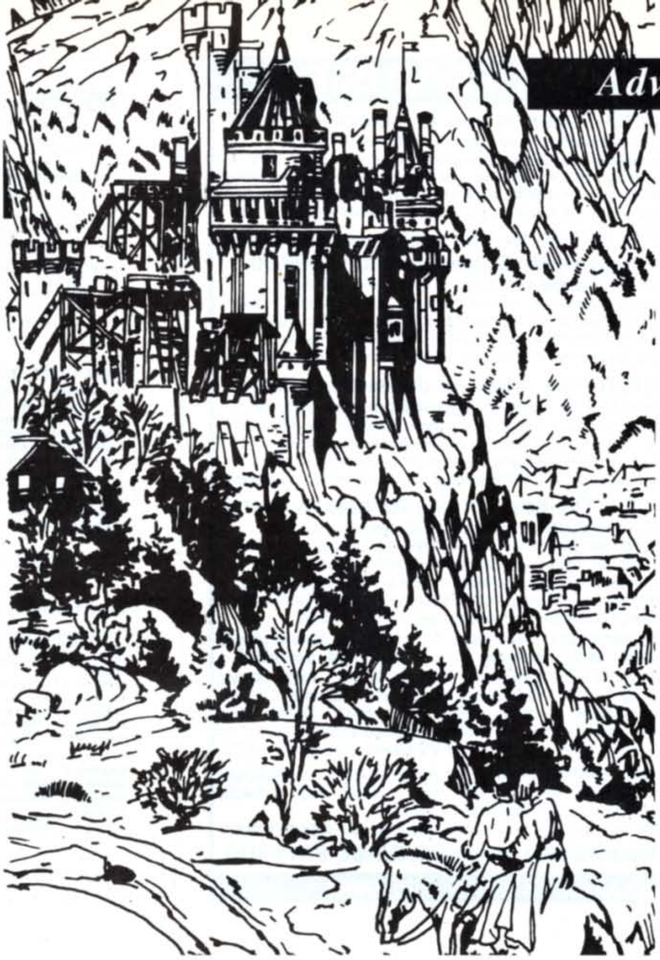
The last question concerned **Terrormolinos** and read: *I have recently managed to finish the game with your help but only scored 90 per cent. What do I have to do for the other 10 percent?*

The answer to this is that, since I am not told what he did to obtain the score he *could* manage, I haven't the foggiest idea what he has left out.

I hope that this rather detailed treatment of how I try to help readers will help you to help me do a better job. I can only work on the information you supply, and though I may be marvellous, I'm not a mind-reader!

Until next month, happy adventuring.

➤



Pious practices on long sea voyages

SEA voyages are something I look forward to – perhaps on account of some Norse ancestry – and certainly ***Erik the Viking*** is packed full of them. Last month I left you back at your longboat, the Golden Dragon, having collected the mountain roots which are part of the bribe for Al Kwasarmi.

So this time we sail from the sandy shore to the shady cove by moving E, S, E, E, S, S, E, E, E, E, S, E, E and E. If you follow the right track you find the Stave Church: Examine the tombstone first and then kneel at the church door and pray. As a general comment, adventurers should *always* be devout rather than profane – piety pays.

Prayer having opened the door, proceed IN. You could always try singing something in the sort of voice that I call an ecclesiastical honk, but that side of church never appealed to me much. I reckon the Almighty doesn't need funny voices to open his ears.

In the chancel you'll find those essential items a bell, book and candle. Examine the book and take the other two items back to the ship.

Now we must travel to the sheltered beach, which means moving W, W, W, S, S, S, S, S, S, W and N. Take the hammer, kindling, whetstone, candle clippers and amulet and climb up the hill path until you are at top.

Examination of the granite slab there elicits the instruction *Knock like Thor* and – since he was the blacksmith of the Norse pantheon – you should give the door seals a good belt with the hammer.

When the door opens light the candle, since you are now about to venture underground, and the door will close behind you as you enter. Proceed steadily down until you get to the hot passage, where you should go east into the round cave.

There are seven snoring dwarves here – shades of Snow White – who, upon examination, turn out to be ladies who just happen to have grown magnificent beards. Since you need to acquire a woman's beard for Al I suggest you do so and delay not upon your going.

West from the round cave takes you back into the hot passage, and if you continue W from there to the beaten ground you can try exploring the sunless plain area.

It shouldn't take you too long to discover that there is no way out – remember the door closed – and that is the reason for including the amulet in your current inventory. Rub it. Eureka, you are back on board the Golden Dragon.

The simplest method of proceeding from here is to retrace your steps from the sheltered beach to the shady cove. Now your destination is the hot rocks. W, W, W, W, N, W, W, W, W, N, N and N should do it.

Wear the helmet and carry the clippers and amulet here and be careful, as this is unfriendly country. E, NW, E, and SE leave you marooned as the ground collapses behind you. Pluck up your courage and go north to the rocks by the cave and then down into the warm cave – aren't you glad you are wearing that helmet? If you now go Down from here you are in a hot passage and you ought to be able to work out where you are and what to do. If you're still stuck, stick around till next month.

(To be continued next month)

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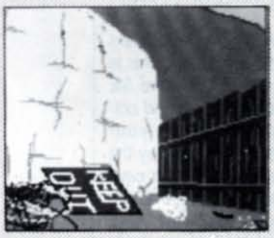

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Artful dodges

Dodgy Geezers was one of those romps that emerged from the same stable as **Hampstead**, **Terrormolinos** and, like them, it is characterised by wacky humour, sickening puns and entertaining puzzles.

Barbara Gibb was kind enough to send me a solution at a point where I was stuck and short of time – and so what follows is thanks to her expertise.

First she makes a general point: In part one, certain things only happen at certain times, but in between you have freedom to explore as well as having to endure periods of waiting around – *T* for turns is a very useful guide to the timing of events. Part two is more straighforward – but you still can't dawdle too much.

The adventure starts with you in a prison cell on a Friday morning just before your release. Go E to a corridor, but if you now go N to the governor's office you will miss George in the visitor's room – and without his help you won't get far into the game. So go S and meet George to receive a piece of paper and some advice. Heeding the advice – to go straight – will mean the end of the game for you, so instead move W to St. Jude's Road and then NE to Pork Pie Parade, NE again to Electricity Street then S into the Korner Kaff.

Ignore everything and *Examine Paper* so that you can now use the public phone to *phone 943 9999*. When the voice asks who you want *Say Ken* and the result will be a dog racing tip.

Now move N, E and E to the dog track where Tweedle will ask for a tip and *Say things in bags* should be your response. Tweedle can now bet and win, then he'll tell you to meet him later in the pub.

Next you should go W, W to Electricity Street then NE, S, and E to arrive outside the Fish Finger pub. *Wait* here until it opens and then go N into the public bar where you'll meet a grateful Tweedle. He will not only buy you a drink but also tell you about a shipment coming in and give you half his winnings.

Since you are in a nefarious neighbourhood it isn't safe to carry money about too much – you'll get mugged – so go quickly S, W, N and W to the dark alley near the snooker hall and *Drop money*, move on E and *Wait* until Friday afternoon – turn 30 – then go E to the builder's yard where the men are having their tea break.

(More next month).

Archimedes & A3000 Owners!

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On firm foundations

Glen Marshall puts the basic routines together. Part 2 of his series on creating a desktop for the BBC Micro

NOW that the backbone of our 8 bit desktop has been completed we can move on to producing some general purpose graphic routines, an interrupt driven pointer and also start on the desktop itself.

Using the four routines from last month we can build up a small library of useful machine code routines. These will be mainly for the desktop program but we can build them into our application software with the minimum of work. For example, most will have a menu. If we build a general purpose routine to produce a menu then, whenever we write a new program, we can save ourselves a lot of work.

Graphic Routines

One of the in-vogue graphic displays is the dropped or shadow box see Figure I. The principle of drawing one is very simple: We draw a normal rectangle with a fine line down the right hand side which starts a few pixels below the top and ends below the bottom. To finish we draw a line of pixels along the bottom this time starting a few pixels to the right.

We can do this using the sprite routine with a fixed colour. To make it more useful we shall parameterise it so that we pass in the colours of each of the three parts of the box. This will enable us to use it in various modes and on different coloured or shaded backgrounds.

These look effective, but sometimes we want just a simple border. For this we draw a normal box shape followed by a similar one – slightly smaller and a different colour – inside the first. However, as each byte controls eight pixels in Mode 3, the borders at the sides will be larger than those at the top and the bottom.

In practice the borders should be four pixels thick. To attain this we can draw a line a byte thick down each side of the box. The byte value would then be set so that only a few pixels are set to the border colour, and the other are set to the box colour.

So if we draw a white box and have a black border three pixels thick for the top and bottom we would set the byte for the left to 00011111 = 31, and the right value to 11111000 = 248. Therefore this routine will require four parameters passed into it – colours for the background of the box, for the top and the bottom border, for the left border and finally for the right side border. Figure II shows how this works. To complement these we must include two routines to erase the boxes.

Another useful routine is one for string printing which will also send VDU codes to the machine. To produce a string routine we simply use a pointer that reads a byte at a time from memory and outputs it to the screen using the system call *oswrch*.

We keep repeating this until all of the string has been displayed. We mark the end of the string with a special character or else we won't know when to stop reading and displaying memory bytes – in this case we will use &FF.

Other routines that we will require will be ones such as to invert and reset the text colours.

We have looked at windows and icons and now let's concentrate on the pointer. All the routines mentioned here can be found in Listing L-2-I on the subscription disc.

First we need to be able to move a pointer around the screen, and if we point to a calculator or a calendar icon and click it that application will be run. We will use the cursor keys for the pointer's direction control, with Copy used for clicking.

The desktop

To test the pointer we'll create the initial Desktop screen which is grey with a white bar along the top for the icons. We can produce a grey screen in a two-colour mode by filling the screen with a byte pattern other than 00000000 = black, or 11111111 = white. If we fill the screen with 170 – 10101010 – we get grey.

Now we need the whole screen to be this shade. There are two ways to fill the screen with a byte value. One is to use our sprite routine, with the co-ordinates set to the size of the screen, the other is to place the byte value into location &375 – OS 1.2, which is the byte the operating system uses to clear the screen. Try typing:

```
MODE3:?&358=170:CLS
```

For OS 0.1 use &36D. Unfortunately the

➤

Figure I: Dropped box

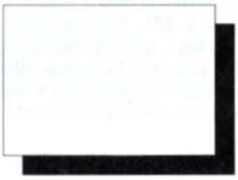
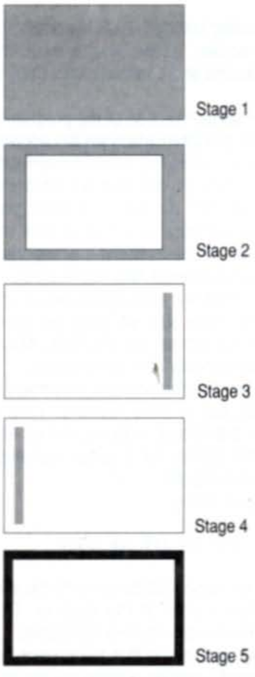


Figure II: Bordered box



LEVEL 2	Desktop Application Basic Program or Desktop Overlay Basic Program	LOADED IN AS REQUIRED &2100 - &4000
LEVEL 1	Desktop Application Machine Code	LOADED IN AS REQUIRED &1ED9 - &2100
LEVEL 0	Desktop Routines Machine Code and General Purpose Machine Code	ALWAYS IN THE MACHINE &1900 - &1ED8

Figure III: How memory is organised

Master always clears with zero, so we either leave the background black or use the sprite routine. We can't use the standard graphics routines because they don't operate in Mode 3.

Although we get a grey screen there is a limitation. Any text looks sort of scribbly where the pixels of the character may or may not mix into the pixel pattern for the background. The simple way around this is to always have a white or a black background for text. You can now see why it is better to have routines with lots of parameters for the colours.

Pointers

To move any shape around the screen you have to draw it in one position, leave it for a while, delete it and re-draw it in a new place. Continuously repeated this produces the effect of an object moving around the screen. As we have routines to draw a sprite and erase a sprite, we are already half way there.

We do, however, need to read the keyboard, and we can do that in assembler by using the equivalent of Basic's INKEY. Set the A register to &81, X to the negative number of the key – see User Guide page 275 – and Y value to &FF before calling &FFF4. This returns 0 in the X and Y registers if the key was not pressed and &FF if it was.

Using this information we can code a section to control the pointer's direction. We can also include a check to see if Copy has been pressed and set a flag accordingly.

Try running Listing L-2-I. This draws the desktop screen, allows you to move the pointer around and continues until Copy is clicked.

One important section of the program is lines 2430 and 2440 which set the address that controls where the saved screen data goes. Locations &2 and &3 hold the address of TOP, the end of a Basic program. As our application programs are going to be written in Basic it is important that we put our saved data above these.

Notice that we add 256 bytes to the address to make sure we pass the space used for variables, as the BBC Micro stores them directly after the program.

You'll see that the pointer's movement is very fast, but is also flickery. This is because the image is being drawn and erased too quickly for it to fool our eyes into thinking it is still..

Try typing in line:

```
2355 LDA #19:JSR &FFF4
```

which is an *osbyte* call to wait until the start of the next frame of the display. This reduces the flicker – but not completed.

Another problem is that the pointer has a black border around it which means anything under it will be covered. The answer is to AND the pointer colours on to the screen with the screen bytes. Try typing line:

```
1520 LDA (coll),Y:AND (ylb),Y
:STA (ylb),Y
```

Now the pointer always stays the same colour as the background, and the black border always stays black. Now let's swap them around. Now the pointer will always be black whatever colour is underneath it, and the border will always be the screen colour underneath it. To do this we use the EOR instruction, which changes 0s to 1s and vice versa. Line 1520 should now read:

```
LDA (coll),Y:AND (ylb),Y
:EOR (ylb),Y:STA (ylb),Y
```

Run the program and see the difference.

We still haven't cured the flicker though. However Richard Vialls' book *Mastering Assembly Language* contains a section on using interrupts to solve the flicker problem: The screen of a TV set or monitor is covered with a substance that glows when an electron beam hits it.

The beam is scanned across the whole screen in a series of horizontal lines and completes a complete frame every 1/50th of a second. This is fast enough to fool the eye into seeing a continuous image. Our problem arises because if the sprite is in the erased state when the beam passes it will disappear for that scan.

Although *FX19 waits for the beam, it returns roughly in the middle of the time it takes the beam to travel from the bottom to the top. So items near the top of the screen vanish or flicker.

The answer is to synchronise the pointer movement with the beginning of the period it takes the beam to move from the bottom to the top of the screen. This means that we will erase the sprite while the beam is moving back up to the top of the screen.

To do this we have to use *FX19 to start an interrupt in a timer in the system VIA to count just long enough to create an interrupt when we need it. Add the new routines in Listing L-2-II to Listing L-2-I and replace the two routines in Listing L-2-I with those in Listing L-2-III. Note that listings L-2-II and L-2-III won't run on their own.

Now run the program and you should have a flicker-free pointer. Notice that the first interrupt instruction erases the pointer, so we had to make sure the pointer was drawn before the first interrupt. This is the reason for the slight change in the *set–pointer–size* routine. If you find your pointer is not perfectly flicker-free, experiment with the values stored in &FE48 and &FE49.

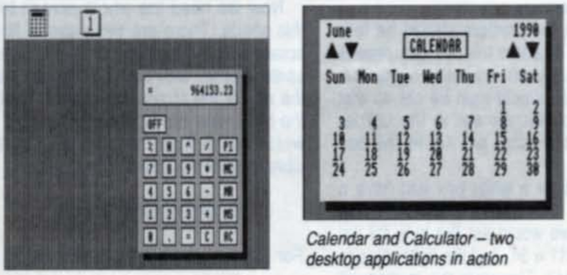
Pointer click

When Copy is pressed we need to know whether it is over an icon or not, and if so which one. We can do this by comparing the pointer position with the positions of each of the icons. Assuming that *X1* and *Y1* is the position of the pointer and *x1*, *y1*, *x2* and *y2* are the coordinates of the icon being checked, the tests you need to perform are:

X1 < x1	Pointer to the left
Y1 < y1	Pointer above icon
Y1 > (y1+y2)	Pointer below icon
X1 > (x1+x2)	Pointer to the right

If all four checks are false the pointer is on that icon. If any of the checks are true the pointer is not on the icon. We can therefore loop around all the icons and carry out these checks on each one. The loop finishes when either all the icons have been checked or the pointer is over an icon. To make the process of checking easier, we arrange each icon's positions in a contiguous manner in memory.

Listing L-2-IV contains a complete flicke free pointer, as well as the desktop and general purpose routines. In this program are some extra routines including ➤



Calendar and Calculator – two desktop applications in action

➤ *pointer–check* which does exactly what is described above. The number of icons to be checked is held in the variable *icons* and if the pointer is clicked on an icon its number is returned in *icon*.

As each has its positions held in memory contiguously, it would seem sensible to hold the colours in the same format. This means that we can write a routine that displays any number of icons automatically – *display–icons* does just that. The number is held in *icons*, the address of the first is in *gpl/gph* and its colours in *coll/colh*.

The routine reads an icon's position and colours then draws it and increments the icon position pointer. There is no need to increment the colour pointer as it is done by *sprite* when the icon is drawn. Listing L-2-IV generates the machine code *Desk-MC* which contains the final versions of all the main graphics routines and is about 1k long.

You can try it out by typing:

```
NEW
*LOAD Desk-MC
MODE3:CALL &1D7A
```

Location &1D7A simply calls the main desktop routine. You will be presented with a grey screen, a white icon bar, a calculator icon, a calendar icon, and of course a flicker-free pointer. Try moving around the screen and clicking Copy.

It will do nothing unless you click it on top of one of the icons at which point you will be returned to Basic.

Memory management

We now have the bottom and most important layer of our desktop. So let's look at how the memory is going to be managed – Figure III. You can see that at Level Zero we are storing the general graphics and desktop routines. These stay in the machine the whole time the desktop is in use.

At Level I we have any applications machine code and at Level II either the Basic overlay or applications program.

The idea is that the Basic overlay program exits at Level Two and when an application is chosen from the desktop it loads that application's machine code at Level II and its Basic program at Level III – in other words on top of itself.

When an applications program is finished with, it automatically loads the overlay program back over Layer Two and the process starts again.

To help clarify this, imagine that the overlay program is running. It has called the desktop screen and you click on the calculator icon. The overlay program loads the calculators machine code below at Level I and then loads the calculator program at Level II over the top of the overlay program.

When the application program has finished it loads the overlay program back into memory at Layer II.

Using an overlay program like this means that we have as much memory as possible for each applications program – essential on the BBC Micro – and, more importantly, we can have as many desktop applications as we require or as many as we can fit on disc anyway.

● *Next month we'll finish the desktop by looking at how to write the overlay, calculator and calendar program. We'll aslo see how to pop up menus using Basic's CALL statement.*

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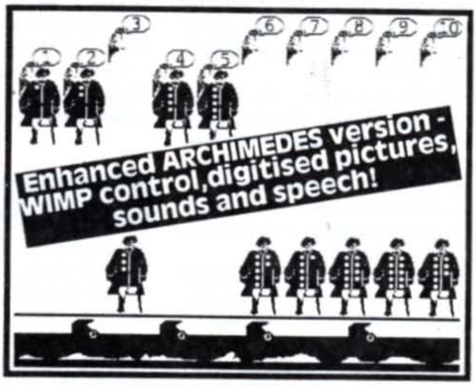
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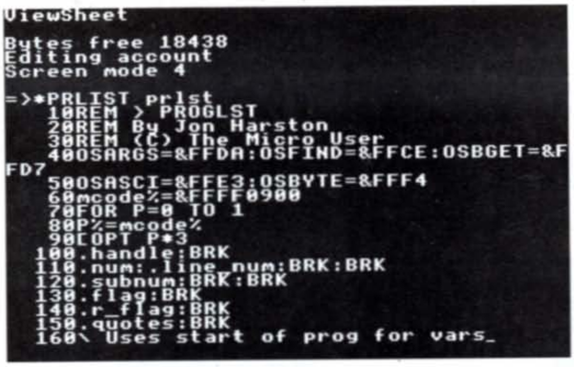

```
ViewSheet

Bytes free 18438
Editing account
Screen mode 4

=>*PRLIST prlst
   10REM > PROGLST
   20REM By Jon Harston
   30REM (C) The Micro User
   40OSARGS=&FFDA:OSFIND=&FFCE:OSBGET=&F
FD7
   50OSASCI=&FFE3:OSBYTE=&FFF4
   60mcode%=&FFFF0900
   70FOR P=0 TO 1
   80P%=mcode%
   90[OPT P*3
  100.handle:BRK
  110.num:.line_num:BRK:BRK
  120.subnum:BRK:BRK
  130.flag:BRK
  140.r_flag:BRK
  150.quotes:BRK
  160\ Uses start of prog for vars_
```

Listing a Basic program from ViewSheet

Basic listing

Need to refer to a program while writing some documentation? Jon Harston has the solution

THERE are times when you want to look at a program on a disc, but you have another in memory and don't want to go through saving it, loading the other program, listing it and reloading the first back again.

Or you could be in the middle of running a program or in an application such as a word processor. What you need is ***PrList.***

The listing on the next page creates a machine code program – PrList – that sits on your disc and will list a Basic program file from disc to your screen. And you can do it from anywhere providing you can enter star commands.

Type in the listing and check it with Get it Right! When run it generates the code. You then save it by copying the command line given at the end of the program.

The command is called by entering:

```
*PRLIST
```

If there is no Basic rom, the file cannot be found or is not Basic appropriate errors are generated.

Once the program has found a correct file, it displays it from the start in exactly the same way as from Basic with LISTO 0 – the LISTO setting is ignored. The listing continues until either it reaches the end or the Escape key is pressed. You can hold down Shift+Control to halt the listing as you go along.

How it works

The first part of the program sets up the position of some variable locations and then goes back to assemble on top of them. This is safe as this part of the program is only executed once, and the variables are all initialised during execution. This helps to squeeze the length down to 512 bytes to fit it into the cassette filing system buffers.

At the start of execution the program checks to see if a Basic rom is present and the current rom number is saved. Location &24B is accessed by *FX187 and contains the rom number of the slot containing Basic – or &FF if there's none.

Next, the file is looked for. OSARGS 1,0 returns the address of the filename, which is then opened and the first byte is checked to be 13. If it is not 13 it's not Basic. This is not the most rigorous of tests – it will let through a text file with the first line of zero length – but it will stop most non-Basic files.

The version number of the Basic rom at address &8008 is then looked at to locate the token table. This is used because Basic programs are compressed in memory. PRINT is stored as the byte &F1 rather than as individual characters.

The program now gets to the main loop. The quotes flag is zeroed to indicated that we are not inside a string. The line number is fetched in two bytes and is printed out with flag set to 32 for leading spaces. The line length is fetched and discarded.

An inner loop is now entered to print out the characters of the line. First the Escape flag is checked, and if it is set, the program tidies up and exits, otherwise a character is fetched.

If the quote flag is set, a jump is made to print the character. If we are not inside a string, and the character is 128 or larger, it must be a keyword token and a jump is made to print it out.

If the character is a quote the flag is flipped. The character is then printed and – if it was not 13 – a jump is made back to do another character. If it was 13 a new line is started.

Next comes the exit routine used when Escape is pressed or the end is reached. The file is closed, the previous rom paged in, and the program finishes.

Following this is the routine to decode the token bytes. If the byte is 141, a jump is made to decode the line number that follows it, otherwise a call to the token printing routine is carried out, and then a jump back to do the next character on the line.

Character 141 indicates a line number after a GOTO, GOSUB or RESTORE. This is stored in three bytes, and the routine fetches them and decodes them. It then prints out the number with no leading spaces, before jumping back to deal with the next character on the line.

The routine to print out a token uses the

➤

Table talk

If you are using the Tube don't worry about the fact that the program resides in the I/O processor. This is because that's where the roms are, and the routine only accesses the filing system and printout routines.

It doesn't interact with the current language at all. In fact, you can be within a different language altogether, or a word processor for example.

The program works perfectly on a network because it's been designed to find out what environment it is in and behave accordingly, instead of assuming it to be the same as the one it was assembled on. This is good programming practice.

There is a question mark in the table of addresses – this is for the version of Basic with byte &8008 set to 3. If you know the correct address you can add it at this point.

➤

address found by the setup part of the program at the beginning. This points to the start of the table.

This holds the text along with the value of the token. The routine searches through the table for a match and then prints the characters.

Finally there is a general purpose 16 bit decimal number printout routine. This works by repeatedly trying to subtract decreasing powers of 10 from the original value and printing out the number of times it was successful before going on to the next digit.

● *This extremely simple but very useful routine will be a valuable aid in program development and writing.*

```
   10 REM > PROGLST
   20 REM By Jon Harston
   30 REM (C) The Micro User
   40 OSARGS=&FFDA:OSFIND=&FFCE:OSBGET=&
FFD7
   50 OSASCI=&FFE3:OSBYTE=&FFF4
   60 mcode%=&FFFF0900
   70 FOR P=0 TO 1
   80 P%=mcode%
   90 [OPT P*3
  100 .handle:BRK
  110 .num:.line_num:BRK:BRK
  120 .subnum:BRK:BRK
  130 .flag:BRK
  140 .r_flag:BRK
  150 .quotes:BRK
  160 \ Uses start of prog for vars
  170 ]
  180 P%=mcode%
  190 [OPT P*3
  200 .start
  210 LDX &24B:CPX #&FF:BNE basic_presen
t
  220 BRK:OPT FNs(CHR$254+"BASIC not pre
sent"):BRK
  230 .basic_present
  240 LDA &F4:PHA:STX &F4:STX &FE30:\ Pa
ge in BASIC
  250 LDY #0:LDA #1:LDX #&A8:JSR OSARGS
  260 LDX &A8:LDY &A9:LDA #&40:JSR OSFIN
D
  270 CMP #0:BNE file_found
  280 BRK:OPT FNs(CHR$214+"File not foun
d"):BRK
  290 .file_found
  300 STA handle:TAY
  310 JSR OSBGET:CMP #13:BEQ basic_file
  320 LDA #0:JSR OSFIND
  330 BRK:OPT FNs(CHR$254+"Not a BASIC f
ile"):BRK
  340 .addrs
  350 OPT FNw(&806D):\ BASIC 1
  360 OPT FNw(&8071):\ BASIC 2
  370 OPT FNw(&0000):\ ?
  380 OPT FNw(&8071):\ HIBASIC
  390 OPT FNw(&8456):\ BASIC 4, Master
  400 OPT FNw(&8257):\ BASIC 4, Z80
  410 .basic_file
  420 LDA #5:LDX &8006:STX r_flag
  430 BMI set_up2:LDA &8008
  440 .set_up2
  450 ASL A:TAX:\ Find the address of th
e token table
  460 LDA addrs,X:STA &AB
  470 LDA addrs+1,X:STA &AC
  480 .line_loop
  490 LDA #0:STA quotes
  500 JSR OSBGET:BCS end_of_file
  510 STA line_num+1:JSR OSBGET:BCS end_
of_file:\ Line number
  520 STA line_num:LDA #32:STA flag
  530 JSR pr_line
  540 JSR OSBGET:BCS end_of_file:\ Line
length
  550 .pr_loop
  560 BIT &FF:BMI escape
  570 LDY handle:JSR OSBGET:BCS end_of_f
ile
  580 BIT quotes:BNE in_quotes
  590 CMP #128:BCS do_token
  600 .in_quotes
  610 CMP #34:BNE not_a_quote
  620 LDA #255:EOR quotes:STA quotes:LDA
 #34
  630 .not_a_quote
  640 JSR OSASCI
  650 CMP #13:BNE pr_loop
  660 BEQ line_loop
  670 .escape
  680 .end_of_file
  690 LDA #0:JSR OSFIND
  700 PLA:STA &F4:STA &FE30:RTS
  710 .do_token:CMP #141:BEQ do_tok2
  720 JSR pr_token
  730 LDY handle:BNE pr_loop
  740 .do_tok2
  750 JSR OSBGET:BCS end_of_file:STA lin
e_num+1
  760 JSR OSBGET:BCS end_of_file:STA lin
e_num
  770 LDA line_num+1:ASL A:ASL A:PHA:AND
 #&C0:EOR line_num
  780 STA line_num:PLA:ASL A:ASL A:STA l
ine_num+1
  790 JSR OSBGET:BCS end_of_file
  800 EOR line_num+1:STA line_num+1
  810 LDA #0:STA flag
  820 JSR pr_line:JMP pr_loop
  830 .pr_token:STA &A8
  840 LDA &AB:STA &A9:LDA &AC:STA &AA
  850 .loop1
  860 LDY #255
  870 .loop:INY
  880 LDA (&A9),Y
  890 BPL loop
  900 CMP &A8:BEQ got_it
  910 INY:INY:TYA:CLC:ADC &A9:STA &A9
  920 LDA #0:ADC &AA:STA &AA:JMP loop1
  930 .got_it
  940 INY:BIT r_flag:BMI pr_t_loop
  950 LDY #0:.pr_t_loop
  960 LDA (&A9),Y:BMI pr_t_end
  970 BEQ pr_t_end
  980 JSR OSASCI:INY:BNE pr_t_loop
  990 .pr_t_end:RTS
 1000 .pr_line
 1010 \ General purpose 16 bit decimal
 1020 \ printout routine.
 1030 \ num holds number. flag holds
 1040 \ leading character, or zero
 1050 \ eg 32 = leading spaces
 1060 \ eg 48 = leading zeros
 1070 \ eg 0 = no leading characters
 1080 LDA #&27:STA subnum+1
 1090 LDA #&10:STA subnum
 1100 JSR do_subtracts:\  10000s
 1110 LDA #&3:STA subnum+1
 1120 LDA #&E8:STA subnum
 1130 JSR do_subtracts:\ 1000s
 1140 LDA #0:STA subnum+1
 1150 LDA #&64:STA subnum
 1160 JSR do_subtracts:\ 100s
 1170 LDA #&0A:STA subnum
 1180 JSR do_subtracts:\ 10s
 1190 LDA num:ORA #48:JMP OSASCI:\ 1s
 1200 .do_subtracts
 1210 LDX #255
 1220 .loop
 1230 INX
 1240 SEC
 1250 LDA num:SBC subnum:STA num
 1260 LDA num+1:SBC subnum+1:STA num+1
 1270 BCS loop:CLC
 1280 LDA num:ADC subnum:STA num
 1290 LDA num+1:ADC subnum+1:STA num+1
 1300 TXA:BEQ zero
 1310 ORA #48:JSR OSASCI
 1320 LDA #48:STA flag
 1330 .zero_exit
 1340 RTS
 1350 .zero
 1360 LDA flag:BEQ zero_exit
 1370 JMP OSASCI
 1380 ]NEXT
 1390 PRINT"*SAVE PrList ";~mcode%;" ";~
P%
 1400 END
 1410 DEFFNs(A$):$P%=A$:P%=P%+LENA$:=P*3
 1420 DEFFNw(A%):!P%=A%:P%=P%+2:=P*3
```

Get it right ✓

```
  10 =    0 0    250 = 1097 8    490 = FA57 D    730 = 235D B     970 = 9894 0    1210 = 15EE E
  20 =    0 0    260 = FA34 9    500 = 682A A    740 = 836A 3     980 = 94A6 5    1220 =  325 7
  30 =    0 0    270 = B6C1 4    510 = 1005 A    750 =  352 F     990 = FABA 2    1230 = 7602 6
  40 = 46A9 9    280 = 7AE0 D    520 = D81B 6    760 = 2A32 D    1000 = D833 7    1240 = 8D00 D
  50 = 281F 0    290 = 76EE 9    530 = 9DC9 A    770 = A951 9    1010 =    0 7    1250 = FD25 6
  60 = CB4B 2    300 = 735F 5    540 = 50B7 0    780 = 664B 8    1020 =    0 7    1260 = A5AD 3
  70 = D689 3    310 = 415C 5    550 = 1B36 9    790 = 682A 5    1030 =    0 7    1270 =  5E2 3
  80 = 20AC 1    320 = BADE 6    560 = E7CE 9    800 = BDEF 2    1040 =    0 7    1280 = 9DD5 C
  90 = 20F3 2    330 = B47D A    570 = CACA 2    810 = EE29 F    1050 =    0 7    1290 = 1F2D A
 100 = 42A2 7    340 = F261 9    580 = 364B 2    820 = 4E3B 5    1060 =    0 7    1300 = 1BED D
 110 = E762 7    350 = BE4F 7    590 = D440 2    830 = A278 F    1070 =    0 7    1310 = BC1C 7
 120 = C9F5 F    360 = FB03 2    600 = 44E5 9    840 = E789 0    1080 = FF68 C    1320 = 5358 A
 130 = FAC4 8    370 = 905C 4    610 = C9DA D    850 = 3311 C    1090 = DD97 A    1330 = 9471 E
 140 = 4237 0    380 = FB03 5    620 = E452 9    860 = 504E 3    1100 = E183 8    1340 = 9843 4
 150 = CDBE 7    390 = 1AFD 0    630 = 4318 B    870 = D48B 1    1110 = A856 7    1350 = 6E2B 7
 160 =    0 7    400 = E048 1    640 = 27BB 4    880 = 16B4 1    1120 = A29E 5    1360 = BAFB 5
 170 = 8B58 E    410 = 77F2 B    650 = 751A 1    890 = 3E9F 3    1130 = E183 5    1370 = 8894 D
 180 = 20AC 4    420 = 34DB 3    660 = 43A6 2    900 = ABFE 1    1140 = EAA2 7    1380 = 5460 6
 190 = 20F3 C    430 = 3F2C 3    670 = E93C 4    910 = F696 A    1150 = 1A4B 0    1390 = 4C4D 7
 200 = 3208 0    440 = BD66 D    680 = 8F2C A    920 = 4EF2 4    1160 = E183 7    1400 = FD2E 3
 210 = BCDE 8    450 = 5505 1    690 = BADE A    930 = C2D8 2    1170 = 1F31 E    1410 =   5F C
 220 = 1BD4 1    460 = DBCD 8    700 = 3532 5    940 = EE4E 0    1180 = E183 7    1420 = 259B 8
 230 = 95AC 2    470 = E91E 7    710 = 2E15 A    950 = 85ED 7    1190 = 6829 8
 240 = 38C9 9    480 = B004 3    720 = DC62 7    960 = 39DD 8    1200 = 1214 B
```

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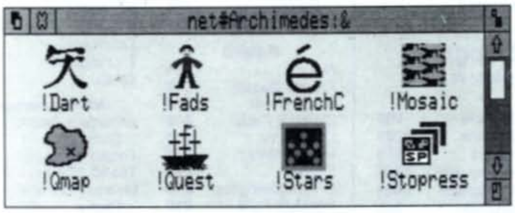

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Watford Electronics' 20Meg & 40Meg hard disc fits internally into the Winchester slot provided.
It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). Price includes the Hard Disc Drive, Controller Podule & fitting instructions. (Self parking fast hard drives.)
P.S. The 310 upgrade requires a backplane and a fan.

● 3HDP – Hard Disc Podule only	£175
● 3HD20 – 20Meg H' Disc + Podule for 310	£319
● 3HD40 – 40Meg H' Disc + Podule for 310	£439
● 2 Podule backplane (Watford)	£25
● 4 Podule backplane (Watford)	£38
● Fan for the backplane	£8
● 4HD20 – 20 Meg Hard Disc for 410	£169
● 4HD40 – 40 Meg Hard Disc for 410	£285
● A3000 Hard Disc Podule only	£195
● A3000 20 Meg Hard Disc + Podule	£369
● A3000 40 Meg Hard Disc + Podule	£489

(Carriage £7)

Desk Top Publisher

Acorn's Archi DTP Package	**£125**
Impression DTP Package	**£135**

ARCHI WORDPROCESSORS

Wordwise + Disc	£20	P.Spellchecker	£40
Image Writer	£25	View	£45
Interword Disc	£20	Viewspell	£32
1st Word Plus – 3	£72	Viewindex	£12
Archie Spell Master	£39	Graphic Writer	£23

DATABASES

AlphaBase	£36	Interbase Disc	£20
Knowledge Organiser	£45	Multistore	£195

SPREADSHEETS

Intersheet Disc	£20	Viewsheet	£45
Sigmasheet	£55		

BUSINESS GRAPHICS

GammaPlot	£50	Interchart Disc	£20

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet, Time Management & Business Graphics	£89
Pipedream 3 – Wordprocessor, Database & Spreadsheet	£125

(P&P on above £2)

GRAPHICS, ART, DESIGN & GAMES

GRAPHICS		Holed Out Golf	£17
Atelier	£84	Hyperpack (12)	£79
Artisan II	£59	Hoverbod	£11
Pro Artisan	£85	Ibix the Viking	£14
Archeffect	£20	Inter Dictor	£25
Autosketch II	£75	Jet Fighter	£10
Graph Box	£64	Minotaur	£11
Kermit	£46	Missile Control	£11
Lingenuity Presenter II	£39	Orion	£12
Render Bender	£59	Pacmania	£14
		Repton 3	£17
GAMES		Talisman	£14
		Thundermonk	£11
Alerion	£11	Zarch	£15
Arcade Soccer	£17		
Battle -Tank	£14	**Miscellaneous**	
Clares 3 Pack	£12	Armadeus Sound Sampler	£59
Conqueror	£19		
Enthar Seven	£22	Toolkit (Beebug)	£32
E-Type	£17	Toolkit (Clares)	£42
E-Type Designer	£15	Hearsay Comms Pack	£55
Freddy's Folly	£10		
Holed Out Designer	£17	Genesis	£70

SILICON VISION Corner

Data Vision	£74	Film-Maker	£59
Gerber Plot	£93	Office Tools	£219
Risc Basic	£74	ROBO LOGO	£54
Solid CAD	£74	Share Holder	£74
Super Plot	£20	Solids Render	£59
Super Dump	£20	Solid Tools	£199
Arc PCB Professional			£275
Gate Array Design System			£67
Financial Accounts			£129
Realtime Solids Modeller			£110

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77			£89 each
ANSI C Release 3			£129
Assembler; LISP or Prolog X			£155 each
LOGOTRON LOGO			£55
ROBO LOGO	£54	TWIN EDITOR	£25
RISC BASIC	£85	BASIC Compiler	£89

(P&P £2 on above packages)

MINERVA's Archimedes Software

Sigmasheet	£55	Sales Ledger*	£53
Home Accounts*	£40	Purchase Ledger*	£53
Stock Manager*	£53	Reporter	£29
Nominal Ledger*	£53	Mailshot	£29
Ancestry	£59	MultiStore	£195
Gammaplot	£50		
System Delta+	£55		
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£118

** Requires System Delta*

(P&P on above items £2)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Archimedes Micros, Philips, Microvitec, and Multiscan COLOUR Monitors. Also on the full range of Panasonic Printers.

Should your machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours to repair the unit. (P.S. This offer is over and above our Unbeatable Winter Sale Offers on Archimedes Micros). (Offer applicable only when bought at prices advertised in this advert).

Archi Graphic Tablet

This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

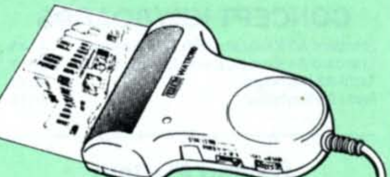
The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this port itself.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

(For further details, please telephone or write in for our FREE catalogue.)

Special Price £249 (carr. £4)
(Price includes Tablet, Leads & Software)
Stylus Optional Extra £29

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

Price £149 (P&P £4)

Special Discount Scheme

For Teachers, Lecturers & Education.
Please phone for further details.

Z88 Portable Micro

Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

● 32K RAM Pack or 32K EPROM Pack	£18.00		
● 128K RAM Pack or 128K EPROM Pack	£45		
● 512K RAM Pack	£175		
● Z88 Eprom Eraser Unit	£35		
● Z88 Spellmaster for Pipedream	£51		
● Z88 Carrying Case	£9		
● Z88 Computing Book	£9.95		
● AA Nicad Rechargeable Battery	£1.50		
● Battery Charger Compact & Fast	£6		
● Z88 Serial Printer Cable	£9		
● Z88 Parallel Printer Cable	£25		
● Z88 to BBC Link	£20	● Z BASE	£56
● Z88 to PC Link II	£30	● Z TAPE	£42
● Z88 to Macintosh	£52	● Z TERM	£42
● Z88 Mains Adaptor	£9	● Z88 Modem	£149

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
(Please telephone for price & availability)

ULTIMUM – Archimedes A3000 Podule Racking System

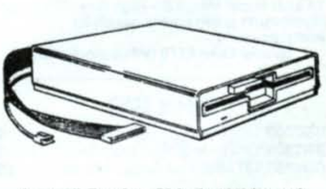
When Acorn originally designed the Archimedes micro, they released to all interested parties the specification of the expansion podule. This has now become the accepted standard for all manufacturers of Archi peripherals. The A300 & A400 both allowed expansion internally up to 2 or 4 podules. However, a newcomer to the affray has caused some upset. A3000 has only a single podule expansion slot, on the outside. There has been deliberation in the industry about a controversial "mini-podule" to be fitted to a special rack. This would entail a re-design of all the available podules onto a smaller board and understandably the manufacturers have rejected the idea completely. As always, Watford have come up with the only real solution to the A3000 expansion problem. The Ultimum Podule Racking System allows up to 3 full size standard A300/A400 series podules to be fitted to the computer. There is also provision for a hard disc drive and podule. Ultimum has its own PSU. There is also an IEC mains output socket for a monitor. It mounts on top at the rear of the computer, and allows direct access to the floppy drive and reset button, rather than obstructing access as on other non standard systems.

Watch this space for launch details.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) £399*(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during May

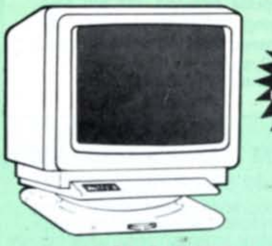
ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£47
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01S £899	Filestore E40s £749
Filestore E60S £949	Ecolink £270

(Carr. £2 to £7 depending on the weight)

Continued→ → → → → → → → →

MONITORS



12 months FREE maintenance on site

MICROVITEC 14"

● **1431** – Standard resolution as used on the BBC television computer programme	£175
● **1451** – Medium resolution, suitable for word processing in mode 0	£219
● Cub3000 Medium Res for A3000	£195
● **1455** – MS Medium resolution, ideal for Archimedes	£220
● **1441** – High res, exceeds the capabilities of the BBC Micro	£359
● **1431AP** RGB + PAL and AUDIO	£199
● **1451AP** RGB + PAL and AUDIO	£255
● **2030 CS** 20" Med Res	£380
● **2040 CS** 20" Hi Res	£675
● Dust Cover for Microvitecs	£5.50
● **Touchtec 501 Touch Screen**	£239

14" MULTISCAN COLOUR

● **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen	£399
● **TAXAN** 770 LR Low Radiation, auto-scanning Ultra High Res	£429
● **TAXAN** Multiscan 870 16" Monitor	£575
● EIZO 8060H – For technical info. read the review in Micro User, Jan. '89	£389
● EIZO 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch	£469

- **TAXAN** Super Vision 3 – High Res 12" Colour Monitor/with green screen switch for wordprocessing
  Special Offer **£179** (While stocks last)

PHILIPS

● **BM7502** 12" Hi-res Green Monitor	£70
● **BM7522** 12" Hi-res Amber Monitor	£71
● **CM8833** 14" Med. Res Colour Monitor	£215

STAR BUY

- **PHILIPS** 14" Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

- **PHILIPS** 14" Refurbished monitor, same as above at a special offer price
  Only **£120** (Offer valid while stocks last)

Dust Cover for Philips Monitors **£6**

(Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors **£8** (carr. £2.50)

for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

Roland Plotters

(Official Roland Appointed Distributor)

● **DPX 2500**	**POA**	● **DXY 1100**	£595
● **DXY 1200**	£835	● **DXY 1300**	£1015

Panasonic KX-P1081

12 MONTHS FREE MAINTENANCE ON SITE

SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

● **KX-P1124** 24pin 80col. 192/63 CPS	£215
● **KX-P1540** 24pin 136col. 240/80 CPS	£415
● **KX-P1592** 9pin 136col. 216/45 CPS	£275
● **KX-P1595** 9pin 136col. 288/61 CPS	£345
● **KX-P1624** 24pin 132col. 192/63 CPS	£349
● **KX-P1695** 9pin 132col. 330/86 CPS	£349
● **KX-P4420** NEW 8PPM Laser Launch Offer	£999

- **Panasonic KX-P4450i** LASER PRINTER Latest technology at Watford's special offer price **£1,299**

● Spare Toner	£29	● A4 Feeder	£55
● Drum Unit	£149	● Developer	£115
● 1MB RAM Upgrade			£299
● 2MB RAM Upgrade			£585

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

BUFFERS

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592	£32	**P19** P1124/1180	£55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110	for KX-P1081, 1592 & 1595	£8
P115	for KX-P1180	£8
P145	for KX-P1124	£8
P140	for KX-P1540	£10
	Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9.95 each

INTEGREX COLOUR JET

● Colour Jet 132 Printer	£515
● Paper Roll	£6.50
● Screen Dump Software	£10
● Colour Cartridge	£19.50
● Black Cartridge	£11.25
● 100 A4 OHP transparencies	£55
● 8K Serial Interface Optional	£123

Citizen Printer Swift 24 £249

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns	£439	**NEC P7+** 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		
NEC Ribbons for		P6 **£8;**	P7 **£9.50**

Hewlett-Packard Printers

12 months FREE maintenance on site

HP Quiet Jet Plus	£437
HP Desk Jet Plus	£549
HP Paint Jet Colour	£719
HP LaserJet Series IIP	£829
HP LaserJet Series II	£1235
HP Laserjet II TONER	£85
HP Scanjet Plus	£1199
HP Desk Writer	£669
HP Laserjet II	£1275
HP Laserjet IID	£1899
1Meg RAM for Series II	£199
2Meg RAM for Series II	£399
1Meg RAM for Series IIP	£215
1Meg RAM for Series IIP	£449

Star Printers

LC10 Printer	£132	LP8 Laser	£1199
LC10 Colour	£175	XB24-10 r	£399
LC15	£275	XB24-15	£539
LC24-10	£199		
LC24-15	£349	XB Colour Kit	£35

Cut Sheet Feeder

LC10/LC24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

EPSON PRINTERS

EX800	£429	LQ860 Colour	£520
EX1000	£564	LQ1050	£575
FX850	£315	LQ1060	£649
FX1050	£409	LQ2550+	£899
FX1060	£679	LX400	£132
GQ5000 Laser	£975	LX850	£179
LQ400	£198	SQ850	£515
LQ850	£459	SQ2550	£869
LQ550	£269		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

TRACTOR FEED for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

ACCESSORIES

● EX800/1000 Colour Option	£55
● EX800/1000 Colour Ribbon	£14
● LQ2500 Colour Option	£65
● Multifont Card for LQ550/850/1050	£95

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 6'	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
● 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
● 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1,000 Sheets true A4 Fanfold Paper 70gms	£11
● 2,000 Sheets true A4 Fanfold Paper 70gms	£19
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

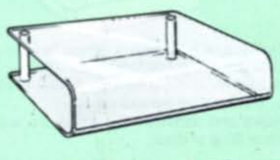
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	**£5.00**
1,000 90 x 36mm (Twin Row)	**£4.90**
1,000 90 x 49mm (Twin Row)	**£7.50**
1,000 102 x 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

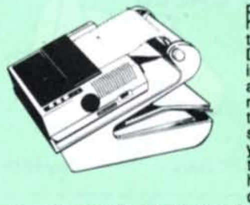
Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £28 (carr. £3)
132 Column version £30 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	**£3.00**	**–**
BBC Micro	**–**	**£3.50**
BBC Master	**–**	**£4.00**
Archimedes Micro pair	**–**	**£9.00**
Citizen 120D	**£3.95**	**£4.50**
DMP2000	**£3.75**	**£4.75**
EX/LQ800	**£4.50**	**£4.50**
EX/LQ1000	**£6.75**	**£5.00**
RX/FX80/85/800/MX80	**£3.25**	**–**
FX/MX/RX100/1000	**£5.00**	**–**
Kaga/Taxan KP810/815	**£4.90**	**£5.00**
LQ500/550/800/850	**£4.50**	**£6.00**
LQ1050/LQ2500	**£7.00**	**–**
LX80/86/800/850	**£3.25**	**£4.50**
M1009/GLP	**£3.80**	**£3.75**
NEC P2200	**£6.00**	**£5.00**
Panasonic KX1080/81	**£3.50**	**£4.75**
Panasonic KX-1124	**£8.00**	**£5.00**
SQ2500	**£23.00**	**£5.50**
Star LC10/NL10	**£4.25**	**£5.00**
Star LC24-10	**£5.00**	**£6.00**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changer

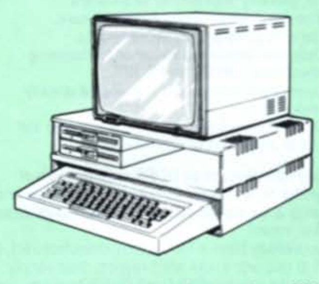
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	£4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



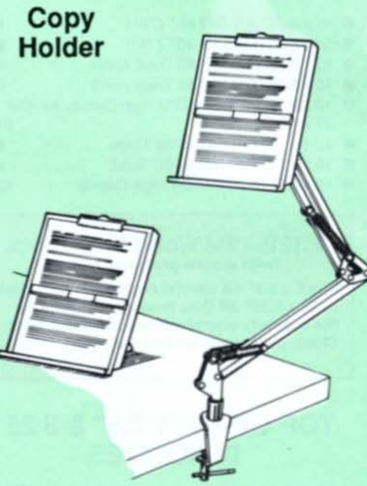
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Printer Plinth	420 x 310 x 105mm **£12**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	**£19**
Compact AB Switch RS232	**£18**

(Cables extra at £6 each)

MEGABUFFER 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

THE EPSON RX-FX-KAGA

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you are with all sorts of printouts to show its capabilites – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

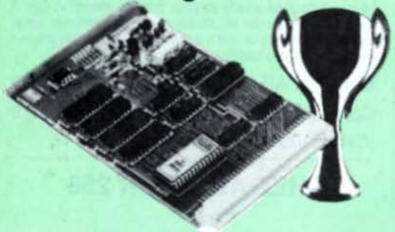
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



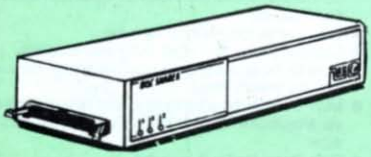
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £215

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

DISC DRIVE SHARER

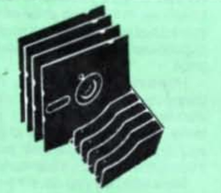


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Offer Price : **£55** Price includes 3 Cables

DISC PLONKER RACK



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

● Watford sophisticated DFS ROM	£16.00
● Watford DFS Kit complete	£69.00
● We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
● DFS Manual (comprehensive)	£6.95
● Acorn DNFS ROM	£17.00
● Acorn ADFS ROM only	£25.00
● Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

● SPECIAL PRICE	£44.00
● DDFS Manual (No VAT)	£6.95
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	£30.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

● *10 x 5.25" S/S D/D 40T (744)*	*£5*
● *10 x 5.25" D/S D/D 40T (745)*	*£7*
● *10 x 5.25" S/S D/D 80 Track (746)*	*£8*
● *10 x 5.25" D/S D/D 80 Track (747)*	*£9*
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£14*
● *10 x 3.25" S/S D/D 40/80 Track*	*£9*
● *10 x 3.25" D/S D/D 40/80 Track*	*£9*
● *10 x 3.5" Double Sided High Density*	*£22*

FREE – 3M World Desk Clock

(with special promoted boxes)

Buy 5 x 3.5" 3M special promoted Disc boxes, or 10 x 5.25" 3M Disc boxes and qualify for the specially commissioned 3M World Desk Clock. (Offer valid while stocks last).

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

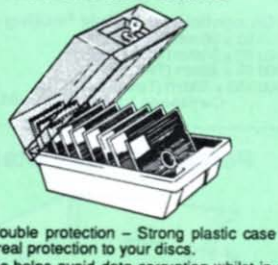
● *10 x **M3** 3.5" D/S D/D 80 Track*	*£9*
● *10 x **M9** 3.5" D/S High Density*	*£22*
● *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
● *10 x **M5** 5.25" D/S D/D 40 Track*	*£7*
● *10 x **M7** 5.25" D/S D/D 80 Track*	*£9*
● *10 x **M8** 5.25" D/S H/D Hi-Density*	*£13*
● ***M2** 3" Double Sided*	*£3 each*

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS



Gives double protection – Strong plastic case that affords real protection to your discs.

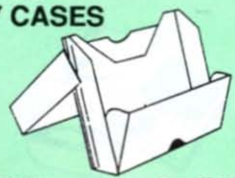
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.

Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	£4.95
● **M85** – holds up to 95 5.25" discs	£6.95
● **M25*** – holds up to 25 3.5" discs	£4.95
● **M50** – holds 50 3.5" discs	£6.50
● **M10** – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. **Only £2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£30	£35	£40
● With Sleeves	£33	£38	£43

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

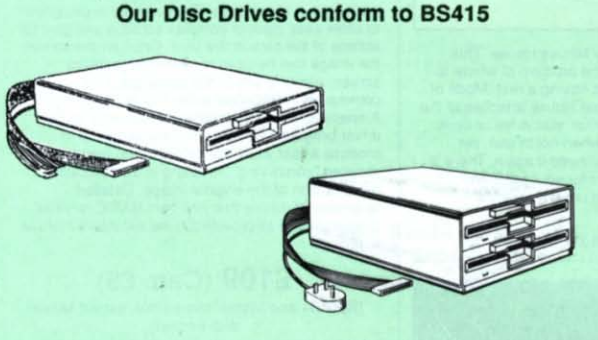
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.** We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £74	CLD400 £168	CS 400S £83	CD400 £165
800K (1,44M		CLD 800S £149		CD 800S £162
● TWIN Disc Drive Case, complete with Power Supply & Cables **£43** **Securicor carriage on Disc Drives £6 to £7**				

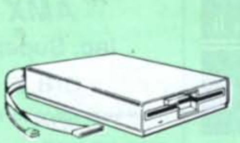
Prefix ***C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

Suffix ***S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Cable to connect 5.25" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

● **CLS35 400K Unit £65** ● **CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

● **CS35 Single 400K £85** ● **CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

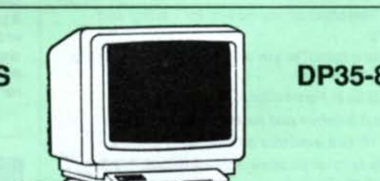
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£395** (carr £7)

CDPM 800S

DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

● Quest Mouse II & Quest Paint	£58
● Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
● Quest Mouse II only	£29
● Quest Paint Software only	£34
● Quest Font Disc (22 Text Fonts)	£15
● Quest Mouse Mat (Red or Blue or Green please specify)	£3
● Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22

(P.S. Quest Paint is not compatible with BBC Compact)

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

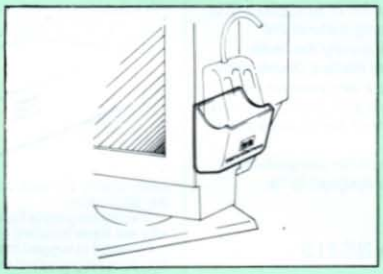
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

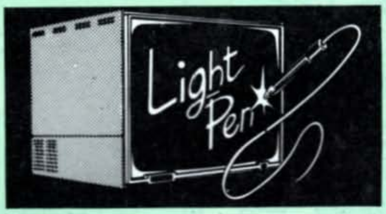
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it. A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

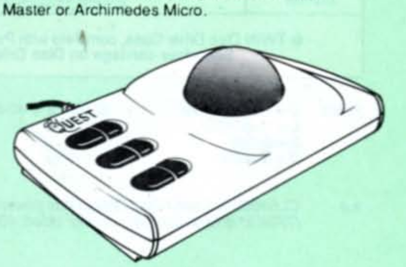
(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

NEW

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	£32
QT-20 Archimedes Version	£35

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/ Word Processor

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

cont./-

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc. Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

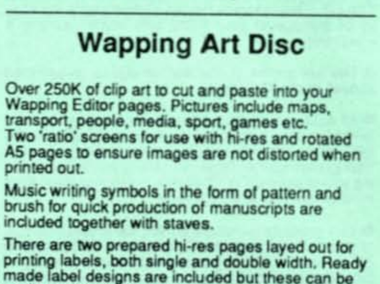
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

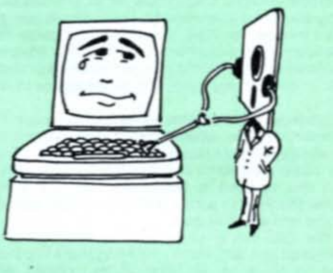
Beeb HandScan & Firmware	£135

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

(Only suitable for BBC B with 8271 DFS)

**CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383**

NEW

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives)

Price: £39

(Please write in for technical literature)

Continued→ → → → → → → → →

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:		
	Aries B-12	£36
	Aries B-12C	£5

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

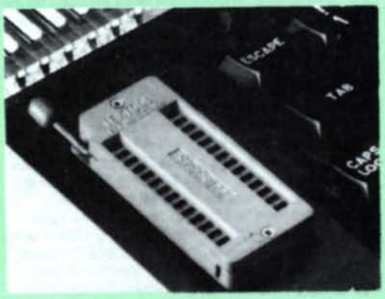
VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 £25

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	£11
● Spare Cartridges	£2.75
● Spare Rack	£1.65

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9;** Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

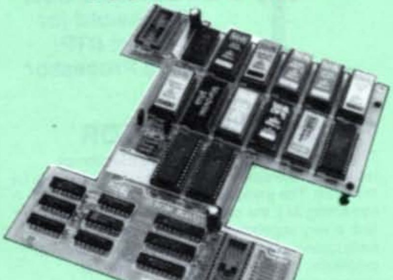
Only: **£29** (carr £2)

Optional Battery back-up fitted £3

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/ Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35

Battery Backup fitted **£39**

Battery Backup only **£3**

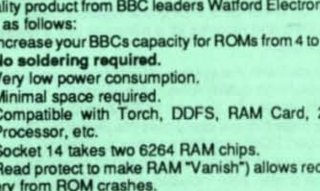
16K Sideways RAM **£8.50**

(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

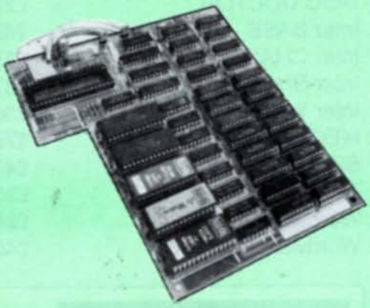
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

NTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM £48
- ROM/RAM card with 64k dynamic RAM £65
- ROM/RAM card with a massive 128k dynamic RAM £109

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches .... £2 each

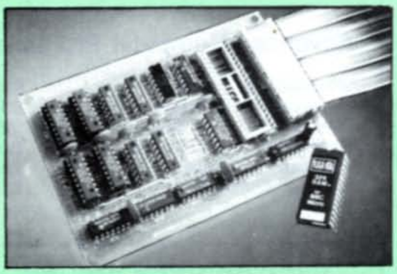
Complete ROM-RAM board
All options installed £115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £18

Watford Electronics are:

- Acorn Qualified Dealer & Econet Referral Centre
- ARIES PC Dealer/Distributor
- Cambridge Computer Dealer
- Epson Silver Centre
- EIZO Monitor Dealer
- Microvitec Appointed Dealer
- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Sub Distributor
- Taxan Monitor Distributor
- 3M Media Premier Distributor

BBC SOFTWARE'S Popular Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
BONDING: Science (Disc) O-Level Chemistry program.	£20.00
ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program.	£20.00
ELECTRONICS IN ACTION (Disc) O-Level program.	£19.95
NEWTON & THE SPACE SHUTTLE (Disc) O-Level program.	£20.00
ECOLOGY (Disc) O-Level program.	£20.00
POLYMERS (Disc) O-Level program.	£20.00
Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
FOOD & POPULATION (Disc) O-Level program.	£20.00
MICROTECHNOLOGY (Cassette) O-Level program.	£11.25
DEUTSCH DIREKT! (Disc & Audio Cassette)	£19.95
Modem Master (Disc)	£11.25
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
Astronomy – Primary (Disc)	£12.00
Computers at Work – Primary	£17.35
Introducing Geography 11-17 years	£17.50
Electric Fields 6-14 years	£11.25
Black Queen Contract Bridge	£13.00
Espana Viva – 3 Discs	£19.95

Educational Software

FUN SCHOOL 2 – Red:

Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. £12.00

FUN SCHOOL 2 – Green:

6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump £12.25

FUN SCHOOL 2 – Blue:

Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. £12.50

Versatile BEEB SPEECH SYNTHESISER Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £3)

Continued→ → → → → → → → →

VIEW 3.0 ROM	**£45**
VIEW PROFESSIONAL	**£50**
VIEWSHEET (Acornsoft)	**£36**
VIEWSTORE	**£36**
VIEWSPELL with 80 track disc	**£25**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£20**
VIEW-INDEX	**£12**
OVERVIEW packs 1 & 2	**£65**
HI-VIEW	**£38**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	**£8**
Juki & Brother HR15 (Disc)	**£8**

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

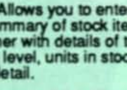
EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

MINI OFFICE II

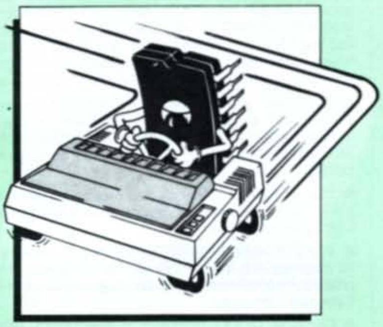
DISC Version for BBC B & B+	**£14.00**
DISC Version for BBC Master	**£16.00**
DISC Version for the Compact	**£18.00**

(When ordering please specify for which Micro & 40 or 80 track Disc)

Advanced Computer Products

Advanced Disc Toolkit	**£28**
Advanced Disc Investigator	**£24**
Advanced 1770 DFS BBC	**£27**
Advanced 1770 DFS Master	**£28**
Advanced File Manager	**£24**
Advanced Control Panel	**£28**

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

COMPUTER CONCEPT'S ROMS

COMMUNICATOR	**£49**
DISC DOCTOR	**£28**
Inter BASE	**£49**
Inter CHART	**£25**
Inter SHEET	**£37**
Inter WORD	**£36**
MEGA-3 ROM	**£76**
SPELL MASTER	**£42**
TERMI	**£25**
Wordwise	**£24**
Wordwise Plus	**£40**

Wordwise plus **£40**

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£5.95
15 Hr Wordprocessing BBC/WW & WW+	£5.95
30 Hour BASIC (BBC Micro)	£12.95
Advanced User Guide for BBC	**£10.95**
Amiga Machine Lang. Guide	£19.95
Archimedes 1st Step – Beginners Guide	£9.95
Archimedes Assembly Language	£14.95
Archimedes BBC Basic Guide	£20
Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Arm Assembly Lang. Prog. Manual	£15
Assembly Language Prog. for the BBC	£10.95
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
BBC Computer Handbook – The Complete	**£14.95**
BBC – Mastering Assembly Code	£8.95
BBC Micro & the small Business	£5.75
BBC Micro – Within the	£13.95
BCPL User Guide	£14
C Big Red Book of	£7.50
C – A Dabhand Guide to	£14.95
C Programming Lang. 2nd Edition	£24.95
COMAL – Introduction to	£9.50
Deutsch Direkt! (Book only)	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
File Handling on BBC Micro	£8.50
FORTH on the BBC Micro	£9.95
Hackers Handbook – New	£9.95
Inside Information, Computers & Coms.	£9.95
ISO-PASCAL Reference Manual	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering Interpreters & Compilers	£14.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Master 512 Guide – Dabs Press	£9.95
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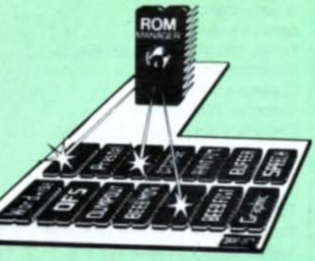

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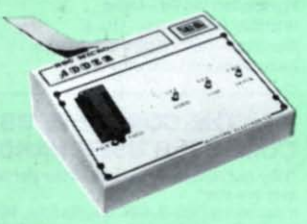

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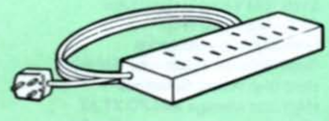

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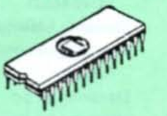

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Perfect pictures

Catalogue your slides using this superb utility by Ken Down

A ONCE in a lifetime trip to the Middle East saw me staggering home with a pile of souvenirs and gifts and about 30 rolls of slide film. These duly arrived back from Kodak in their little yellow boxes, ready for sorting and titling.

This job used to be tedious but practicable, as the slides came in neat cardboard mounts and if you had a fine-point pen and a steady hand there was just sufficient room on the mount to write a brief description.

A couple of years ago Kodak in its wisdom decided to change over to plastic mounts claiming that the cardboard mounts gave fuzzy edges to the slides – which was true. The plastic, however, introduced a different problem. There just isn't a satisfactory method of labelling the slides, short of going out and paying an exhorbitant price for special slide labels in 17 pretty colours.

Ballpoint pens just slip over the smooth plastic without leaving a mark. A permanent overhead projector pen works – at least it doesn't rub off the plastic – but it's hardly fine point.

Faced with 30 boxes to label – a total of 1,140 slides – I decided that there had to be an easier way and that had to involve my favourite micro. In fact, why not kill two birds with one program and keep the details that I typed in as a permanent database of my slide collection?

While tiny printing is feasible using condensed superscript, how do you print on to unbendable slide mounts? Sticky labels are the obvious solution, but most aren't practical. The best results can be obtained using A2 size sheets of sticky paper produced under the names TikTak or Crack-Back. Tracking this stuff down can be tricky – printing companies and their suppliers are the best bet – but make sure you get the permanent adhesive as other types tend to peel off under the projector's heat.

The program is fairly simple: The input routine allows you to hop from field to field altering and editing to your heart's content until you press Return and what you have typed is read off the screen. FNget uses a flag which allows you to specify whether what you type comes out in upper case letters, lower case, or just capital letters at the start of every word. You can even set the flag to accept numerals only and beep when anything else is typed in.

FNreadscreen uses osbyte 135 to read the screen with the statement:

```
character%=(USR(&FFF4)AND&FFFF)DIV&100
```

Note that the number and order of brackets is very important – Archimedes owners may prefer to replace this with

```
SYS"OS_Byte",135 TO,,,,character%
```

Because of the number of slides, the original version needed to handle even the Archimedes does not have enqugh memory to hold a complete set, so the records are kept in a file on disc and read in one at a time. The 800k discs in the Archimedes will hold about 4,000 records but if you have the old 40 track single-sided 100k disc drives fitted to your BBC B you will have to alter the value of max% in PROCinit to something like 500.

Each record consists of two strings. The first holds the information that is printed out for the top panel of the slide and is 175 bytes long, including the two byte code that separates the strings in the file. The second is 182 bytes long and is held in a separate file – D.Extra. To prevent you running into the Can't extend error, which is not trapped by the program, it is best to set up two dummy files first which will reserve the necessary space on the disc.

On the Archimedes, Mode 12's 80 columns in 16 colours is used. On the 8 bit BBC Micro Mode 0 would look best, but there isn't enough room, so the solution is to use Mode 3 but close up the spaces between the lines with a trio of VDU23 commands that directly program the 6845 chip. VDU23;4 tells the micro how many vertical rows there are in the screen, VDU23;7 sets the vertical sync position and VDU23;9 determines the number of scan lines per row, including the spacing.

Normally in Mode 3 there are 23 rows per screen plus a time delay of 7 rows to allow for flyback. The vertical sync value is 27 and there are 10 scan lines per row – eight for the characters in the row plus two for the space between the rows.

I have re-programmed the 6845 to give 8 scan lines per row, omitting the spaces between the rows – like all things computerish, the eight rows are counted 0 to 7 so the correct command is VDU23;9,7;0;0;0;. The vertical sync position changes to 31 which is about half-way between the values for Mode 3 and Mode 0.

Unfortunately there are still only 23 rows, which means that the part of the screen displayed is a good deal smaller than the normal Mode 3 one. As a result the scan has to be switched off for a longer period to compensate, so the time delay is increased to 38.

Of course the program will work perfectly well without all this messing about with the 8254 and its registers. In fact, you could run it in plain, ordinary Mode 3 and just make do with the broken borders. However there is one feature of the input screen that must be closed up if you intend

Customising the program

You can easily alter PROCscreen, which sets up the input screen itself, and PROCdisplay, which puts the record on the screen. Then you need to change PROCin, which uses FNget to input the various fields.

The parameters in this function are the x and y coordinates of the field start, the length of the field to be read and the flag. If you alter the length of any of the fields you will have to adjust PROCsplit accordingly, and if the total string is shorter or longer than the original – l1% and l2% – the factors by which the file pointers are multiplied will have to be adjusted accordingly.

Finally, if you have a different number of fields you will have to alter FNjoin.

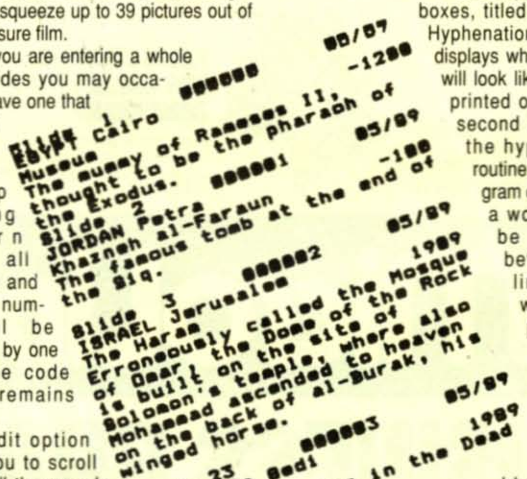
to use it – there's a patch of white on the screen to hold the slide up to when you want to figure out what it is.

When you start a file you are asked for the initial code number that has six figures and provides a unique identification. As you are unlikely to have more than 99,999 slides in a particular category this enables you to use the first digit as a subject or disc identifier. Thus in my system the base code for family slides is 100,000 while the base for pictures from Britain is 200,000.

You can enter a whole box of slides at one go or you can enter individual ones. In either case you must first type in the date on the box in the form month/year, with leading zeroes, so January, 1990 becomes 01/90. Next you enter the start and end slide numbers. With Kodak the start can sometimes be slide 0 and careful management can squeeze up to 39 pictures out of a 36 exposure film.

When you are entering a whole box of slides you may occasionally have one that isn't worth recording. Keep pressing Return through all the fields and the slide number will be increased by one while the code number remains the same.

The edit option allows you to scroll through all the records and alter any that you choose. Shift plus the up or down cursor keys moves forwards or backwards by one record. If you alter any details on a record you should keep pressing Return until you have entered all the fields, otherwise you run the risk of deleting one of them.



```
Slide 1          000000      08/87
EGYPT Cairo                  -1200
Museum
The mummy of Ramesses II,
thought to be the pharaoh of
the Exodus.
Slide 2          000001      05/89
JORDAN Petra                  -100
Khazneh al-Faraun
The famous tomb at the end of
the Siq.
Slide 3          000002      05/89
ISRAEL Jerusalem              1989
The Haram
Erroneously called the Mosque
of Omar, the Dome of the Rock
is built on the site of
Solomon's temple, where also
Mohammed ascended to heaven
on the back of al-Burak, his
winged horse.
Slide 23         000003      05/89
ISRAEL En Gedi                1989
Dead Sea
Timothy floating in the Dead
Sea.
```

The print routine produces tiny text for the slides, here enlarged by 150%

The Find option uses the INSTR function to search for the occurrence of a certain string. As this is case sensitive, if you are not sure whether the word you are searching for begins with a capital or not it is probably best to type it in minus the initial letter. Thus telling the program to search for lasgow will find both Glasgow and glasgow.

When you need to delete a slide you can either retain the original code numbers or adjust them to maintain numerical sequence. If you have already printed out the labels you need to retain the same codes. If not, you may like to be nice and tidy and keep numerical order.

When you press Escape you are returned to the initial menu, but as this may be inconvenient when you are testing out the program pressing Control+Escape at the same time allows you to exit for debugging. Once it is working though, always exit with option 6 as this writes anything in the output buffers to the disc and closes down the open files.

If your printer is not wholly Epson compatible, or if you have a 24 pin one, you'll need to alter the codes in PROCprinterinit. The A2 sheets of TikTak should be cut into strips 18cm wide which gives four labels side by side and 42 labels. The final strip is only wide enough for two labels, hence the question How many labels across? before you start printing.

The print program then asks at which code number you wish to start – just pressing Return will give you the value zero. The next prompt is the code at which you wish to stop printing. If you press Return without entering a number the program will stop at the last slide entered.

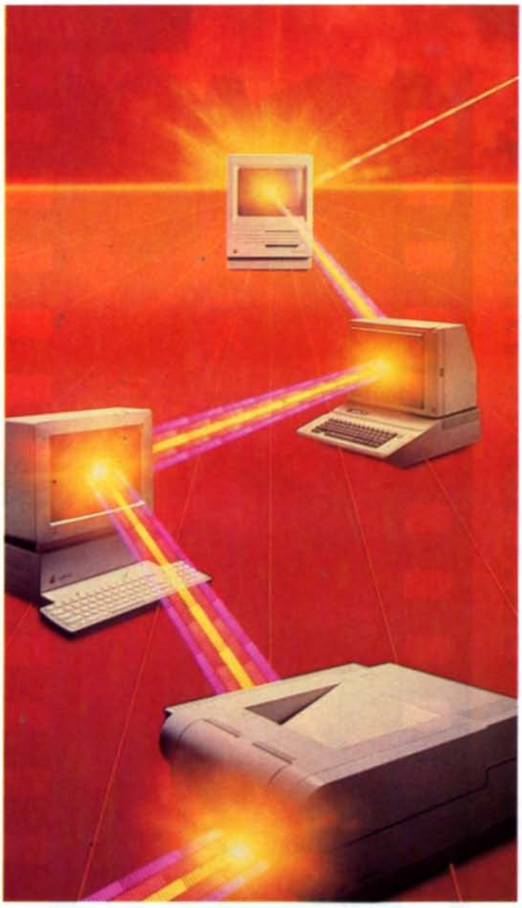
The display has two boxes, titled Label and Hyphenation. The first displays what the label will look like when it's printed out and the second is used by the hyphenation routine. If the program decides that a word should be broken between two lines the word is displayed here with a hyphen in the rightmost possible position. You can use the left and right cursor keys to position it where you want and then press Return to fix it.

Sometimes the program will suggest a hyphen where it simply isn't possible to break the word – for example, thought or road. In such a case press the down cursor key to abandon the hyphenation. The whole word is then transferred to the next line down or even to the next panel down if necessary.

Once the labels are printed you can separate them using a sharp knife and a steel rule to lightly score through the sticky paper but not the backing. It is then simple to peel the labels off and stick them on the slide mounts.

● *So now you have an easy way to label your slides neatly and a database you can use to locate any particular one quickly and easily.*

The three listings for the slides database – slides file and print – can be found on this month's subscription disc or send a formatted disc plus £2 to Ken Down, 66 Ffordd Pennant, Meliden, Clwyd LL19 8PE.



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Don't miss it, or you could miss out on a whole new decade of computing.

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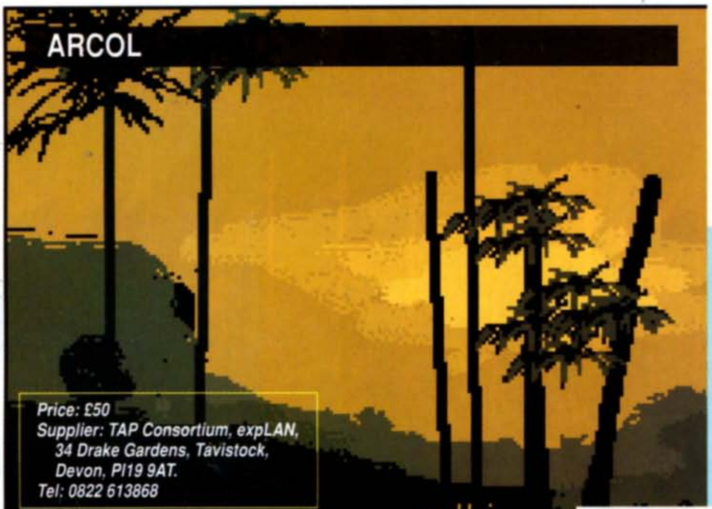


ARCOL

Price: £50
Supplier: TAP Consortium, expLAN,
34 Drake Gardens, Tavistock,
Devon, Pl19 9AT.
Tel: 0822 613868

ARCOL is 256 colour painting package running in Mode 13 with, unusually, square pixels. It allows you to work on a full A4 page to produce double height art work or use the bottom half as a scratch pad.

It features user-defined brushes, 16 colour sub-palettes for colour cycling, auto-selection of colour spreads for smooth shading effects and sophisticated sprite handling with resizing and reshaping. There is a pattern editor, font editor, user adjustable alignment grid plus ability to zoom x2 to x20, import text, recolour, shade, shade fills and colour wash effects. Colour separations can be printed automatically for colour offset work or screen printing.

The multi-user version is fully networkable via Econet, and is probably Arcol's main selling point.

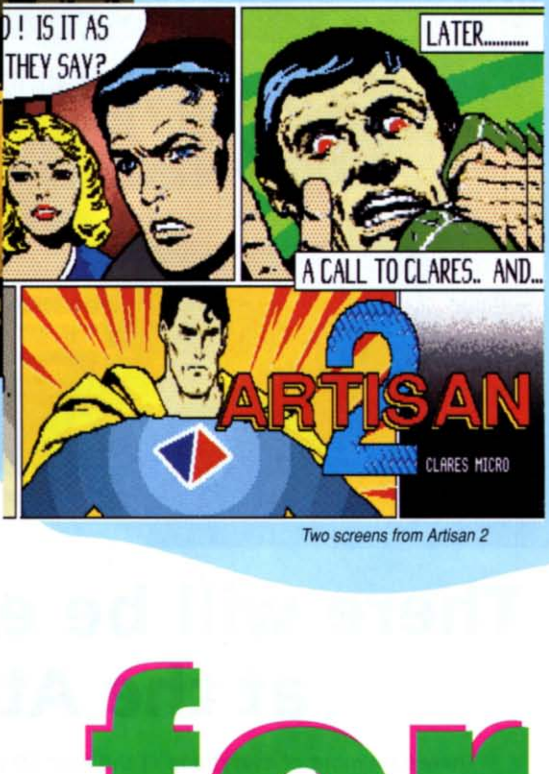
The price for the stand-alone user version is reasonable but, like most of the other cheaper 256 colour graphics programs, it needs a better screen dump.

ARTISAN 2

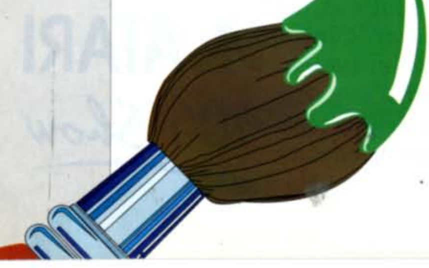
Price: £59.95 or £29.95 if you return your original copy of Artisan
Supplier: Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire, CW9 7PA.
Tel: 0606 48511

IN releasing Artisan 2, Clares has successfully attempted to bring the specification of its 16 colour Artisan as close to that of Pro-Artisan while making the new version easy to operate as part of the newer Risc OS working environment.

The package contains the colour separation program !SPOT which is run independently of Artisan 2 and is used to provide black, cyan, magenta and


! IS IT AS
THEY SAY?
LATER..........
A CALL TO CLARES.. AND...
ARTISAN 2
CLARES MICRO

Two screens from Artisan 2

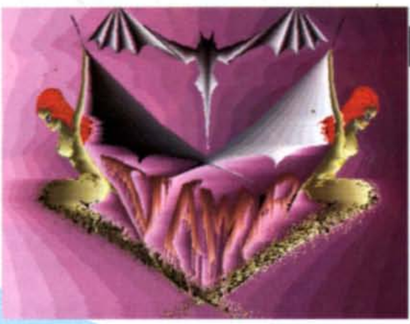


Art for Art's

yellow separation screens for process printing. Artisan 2 is very user-friendly and greatly enhances the original features. Most of the menus have been extended to provide such options as graduated colour fill, sprite enlargement, distortion, textile repeat patterns and perspective drawing aids.

Some of the existing options have been improved – the Sprite Store is now visual rather than merely a list of names.

Artisan 2 will enable many schools to develop the computer-aided art side of the curriculum further, especially in the area of textile design, and will also enable individuals to develop their creative computer skills.



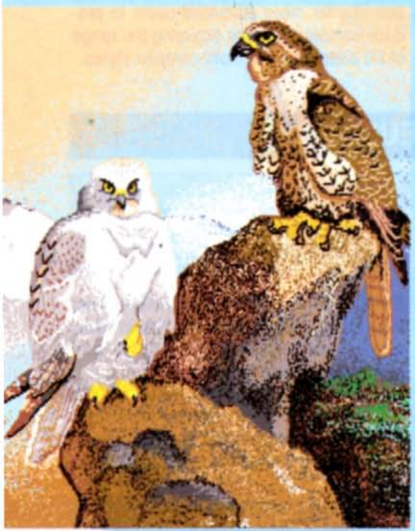
Price: £42.50 inc VAT and P&P
Supplier: Computer Assisted Learning, Strathclyde Business Centre, New Stevenston, Strathclyde, Scotland ML1 4JB

ART NOUVEAU

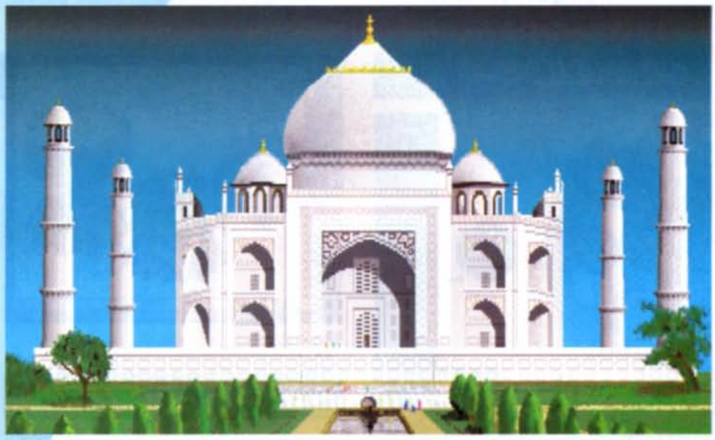
ART Nouveau is an easy-to-use 256 colour professional art package. Although non-Risc OS, it has a logical and friendly working environment and an excellent reference manual.

There is a wide range of tools as well as a second scratch screen. Output can be dumped to an Epson FX-compatible as well as a Integrex 132 Colour Jet printer.

Art Nouveau should do most of what you want out of a computer-aided art package for the Archimedes and is a good first buy.



ATELIER



Price: £99.95
Supplier: Minerva Software, 69, Sidwell Street, Exeter EX4 6PH.
Tel: 0392 437756

ATELIER offers a wide range of graphics tools as well as a good choice of graduated fills giving a range of different effects. These can be pre-selected or worked out by the package to fill in between any two user-selected colours.

A help window can be toggled on or off to give step by step help on screen at each stage of a picture's construction a comprehensive Sprite Editor allows sprites to be manipulated.

Areas of the screen can be manipulated in a number of different ways, including stretching and twisting as well as being mapped on to mathematically defined surfaces or wrapped round rotated objects such as tree trunks or bottles.

Steve Bruntlett browses over a selection of the most popular art and graphics packages for the Archimedes series and BBC A3000

sake

CRAFTSHOP

Prices: Craftshop 1 £29.00 + VAT;
Craftshop 2 £29.00 + VAT
Supplier: 4Mation Educational Resources,
Linden Lea, Rock Park, Barnstaple,
Devon EX32 9AQ.
Tel: 0271 45566.

CRAFTSHOP 1 contains two programs. **Patterns** involves using combinations of up to 20 pre-determined shapes from a menu in up to 16 outline or solid colours to produce complex images.

Shapes can be enlarged, reduced, rotated plus moved in front of or behind others. Groups of shapes may be repeated or reflected as may individual ones. The resulting image can be edited at any stage.

Stitching is the kind of thing which you would expect micros to be ideally suited for, and judging by this program they are. You may have doubts about the educational value of string art if you look at some examples in the manual, but wait until you see the demos on the disc, one of which is animated.

The two programs in the package will give junior school children as well as many adults plenty of opportunity for experimentation and exploration in the production of complex and beautiful geometry-based art work.

CRAFTSHOP 2 also contains two programs: **Embroidery** allows you to design a wide variety of embroidered designs using the 23 existing stitch patterns or by designing your own.

The idea is to design stitch pattern blocks which can be combined to produce an overall pattern or more intricate patchwork design as illustrated in the examples of work on disc.

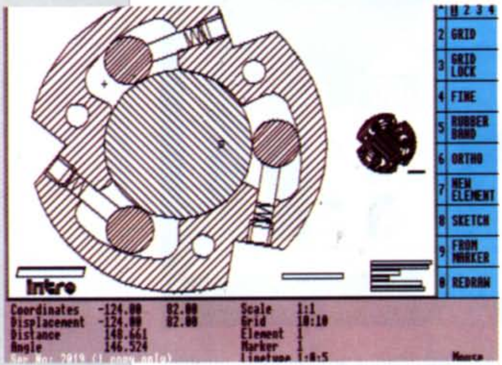
The whole program is a little time consuming and laborious but the results are often very rich.

There are definite possibilities here for interesting and rewarding work if children have the patience necessary to complete a piece of work.

Tiling allows you to work with a wide range of patterns to produce complex tiled images from your own sprites produced with other packages, from your own sprites produced with !Paint, which needs to be installed on the icon bar to run Tiling, or from examples supplied on the program disc.

Tiling has great potential from enabling the preparation of simple square based tiling patterns for beginners to offering potential for more advanced users to produce complex patterns exploring the range of tile patterns in the more complex styles.

DESIGNER INTRO



```
Coordinates   -124.00   82.00      Scale    1:1
Displacement  -124.00   82.00      Grid     10:10
Distance       148.661             Element  1
Angle          146.524             Marker   1
Ser No: 2019 (1 copy only)         Linetype 1:0:5
```

Designer Intro

Price: £75.00 plus VAT
TechSoft UK, Old School Lane, Erryrys,
Mold, Clwyd, CH7 4DA.
Tel: 082 43 318

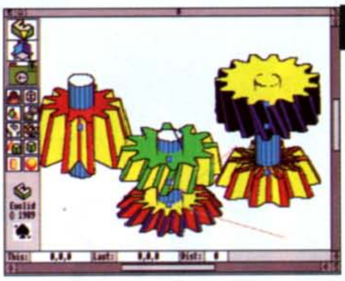
DESIGNER Intro is a draughting system in which all lines and shapes are stored in coordinate form.

Like most CAD packages it is possible to draw at different scales without loss of definition.

Output can be via a wide range of plotters or Epson-compatible printers. These can be set up along with other preferences in a configuration file for regular use.

The manual and tutorials are clearly written and the program handles drawing and selecting options well. A beginner can get straight into the program and move on to the more advanced options as and when required.

The menu structure is well laid out and easy to use although it is not Risc OS-based.



Euclid 2

LEONARDO-256

Price: £19.50
Supplier: Beard Technology, 111 Evering
Road, London N16 7SL.

LEONARDO-256 is based around a powerful pixel editor but with a number of drawing functions both on the original image and at any of the levels of magnification – 1, 2, 4, 8 and 16).

The package can take input directly from a digitiser and could be used to tidy up digitised screens, add text to them and use the resulting screens for presentation purposes.

EUCLID 2

Price: £70.00
Supplier: Ace Computing, 27 Victoria
Road, Cambridge CB4 3BW.
Tel: 0223 322559

EUCLID 2, one of the first multi-tasking Risc OS applications for the Archimedes, allows you to create 3D objects and scenes in any screen mode.

For example it works in Mode 12 with 128 colours by using dithering techniques saving memory on Mode 15 usage. It can be used with mouse, trackerball or digitiser.

The design editor allows you to create and combine geometric solids and also set camera positions and lighting strengths. Shapes can be extruded and swept to save time but they only use a single colour, unlike solids which can have different colours on each panel to create a more realistic appearance.

The package is very intuitive in use, as a Risc OS application should be.

Files can be animated using the Mogul package, separately available, which forms a complete multi-tasking environment for 3D modelling production and animation.

FILM-MAKER

Price: £79.95
Supplier: Silicon Vision, Signal House,
Lyon Road, Harrow, Middlesex HA1 2AG.
Tel: 01-427 5169

FILM-Maker enables three dimensional scenes or objects created with SolidCAD or Realtime Solids Modeller to be animated into a film running independently of FILM-Maker. It can produce and record a sequence of frames which when made into a film show a flight through complex three dimensional scenes. This sequence of frames can be animated as fast as a frame a second – not as fast as conventional animation, but nevertheless impressive.

FILM-Maker greatly extends the usefulness of the three dimensional scenes or objects created by SolidCAD or the Realtime Solids Modeller. It allows you to experiment with three dimensional animation at whatever speed you like.

PARAMETIC DESIGN TOOL

Price: £359.00
Supplier: Oak Computers, Cross Park House, Low Green, Rawdon, Leeds LS19 6HA.
Tel: 0532 502615

PDT is an advanced CAD package which can be used for industry-standard design with the advantage of animation. It looks like a conventional CAD package and as such has a wide range of options for drawing and editing points, lines, circles and arcs.

The drawings produced with PDT are parametric, which means that if you change the size of a cog on a drawing of a bicycle, for example, then the chain around the cog adjusts automatically as do any dimensions on the drawing.

Groups of components can be easily moved and allow a series of drawings to be animated into a PDT film.

At this price it is probably not for home use but in terms of use in industry its the only package which can compete with AutoCAD – and probably beat it.

LINCAD

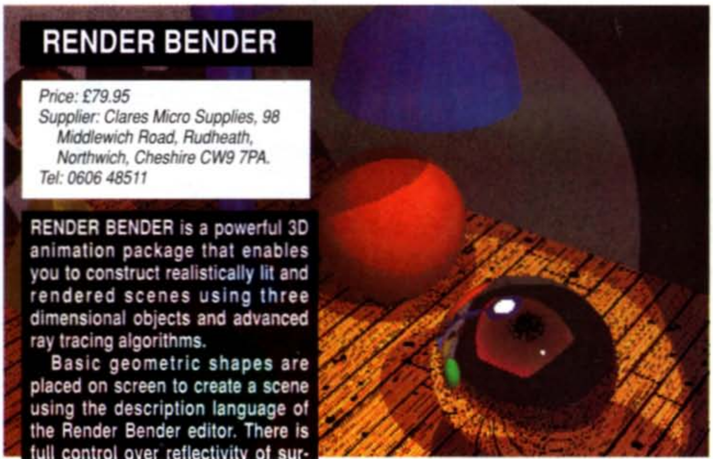
Price: £150
Supplier: Linear Graphics, Unit 39, Mochdre Industrial Estate, Newtown, Powys SY164LE.
Tel: 0686 629292

LinCAD Archimedes is claimed by Linear Graphics Limited, to be an advanced 2D draughting and design software tool, that harnesses the unrivalled power of the Archimedes to perform comprehensive, often complex, operations.

Features include the creation of items such as lines, arcs, circles, boxes, polygons, ellipses, text and spline curves in 16 colours and 7 different line styles.

The dot matrix printouts are of excellent quality and certainly good enough for most users.

The drawings provided on the program disc are excellent and clearly demonstrate the power of this comprehensive package. However, the program is limited to working on a single screen and makes no concessions to Risc OS and the multi-tasking environment.



RENDER BENDER

Price: £79.95
Supplier: Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7PA.
Tel: 0606 48511

RENDER BENDER is a powerful 3D animation package that enables you to construct realistically lit and rendered scenes using three dimensional objects and advanced ray tracing algorithms.

Basic geometric shapes are placed on screen to create a scene using the description language of the Render Bender editor. There is full control over reflectivity of surfaces, lighting and texture.

The Delta animator allows you to put together animated sequences on several discs if necessary or preferably a hard disc. The whole program encourages you to experiment with the scenes you have created or the scenes and objects provided on the disc.

The separately available set of demonstration discs shows what is possible with a bit of patience and a lot of imagination.

This is a fascinating area of graphics to get into.

SOLIDCAD

Price: £99.95; Also as part of SolidTOOLS which contains SolidCAD, FILMMaker, SolidsRENDER, Realtime Graphics Language, SuperDump and SuperPlot £275.00
Supplier: Silicon Vision, Signal House, Lyon Road, Harrow, Middlesex HA1 2AG
Tel: 01-427 5169

THIS package consists of a single disc and an extremely comprehensive manual with several excellent tutorials covering the construction of a cube and pyramid, zooming and panning, swept and extruded surfaces, macro operations, the tools option, camera perspective and smooth shading.

For home use it has a great deal to offer in terms of creating images purely for pleasure. For professional use SolidCAD is an extremely powerful modelling tool with a wide range of applications.

Its very easy to use and extremely well documented if you get stuck or if you want to experiment with intersecting solids.

MOGUL

Price: £20.00
Supplier: Ace Computing, 27 Victoria Road, Cambridge CB4 3BW.
Tel: 0223 322559

THIS animation package allows you to turn Euclid objects or scenes into animated films.

Euclid
Euclid

As Mogul is Risc OS-based it multi-tasks with Euclid to produce a complete 3D solids creation and animation system.

An extension of Euclid, it can be used independently, but a good working knowledge of Euclid 2 is also required to get the best from the package.

Objects can be animated independently using the motion control file.

Resulting films may be of up to 250 frames and up to 10 seconds long but they can be strung together using Projector.

PRO-ARTISAN

Price: £99.95
Supplier: Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwhich, Cheshire CW9 7DA
Tel: 0606 48511

PRO-ARTISAN is the follow up to Clares very successful package Artisan, and is a 256 colour graphics program. It comes as a two disc package with a clear, well-laid out and nicely illustrated manual which covers all the options available with a series of 23 exercises and a few of the many combined options possible.

New features include graduated fills, gridlock, Bezier curves, airbrush, wash, and global magic brush. It also has several powerful new tools which might be used for the creation of sophisticated pieces of computer-aided art and design.

The possibilities offered by the combination of tools to produce unique effects is also one of its main attractions. Pro-Artisan is an expensive package, but worth every penny. It still has the best colour printout facilities of any package I have seen.

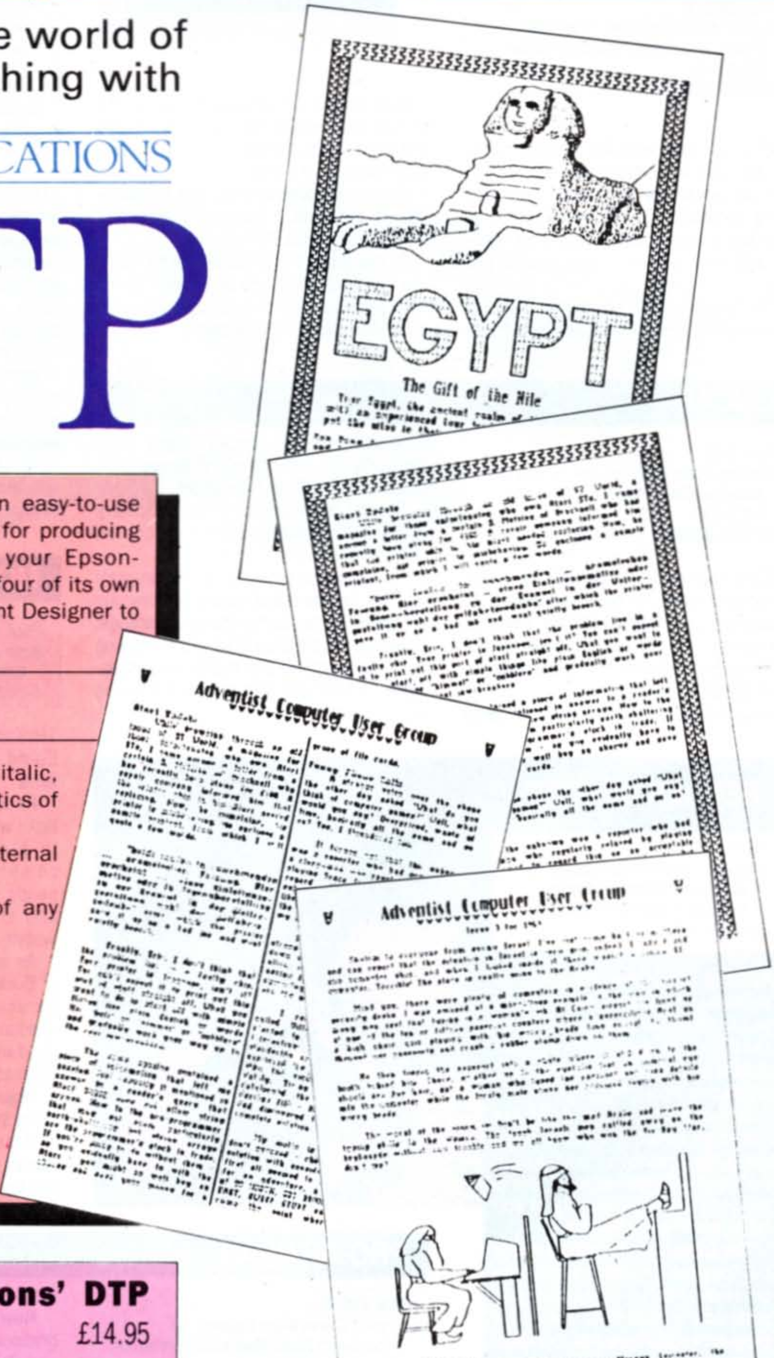
Take a step into the world of professional publishing with

DATABASE PUBLICATIONS DTP

Database Publications' DTP is an easy-to-use and flexible page design system for producing high-quality printouts through your Epson-compatible printer. It comes with four of its own fonts to get you started plus a Font Designer to keep you going.

Some of the features of Database Publications' DTP

- Independent control of bold, italic, 'thin' and underline characteristics of any font
- Proportional spacing of both external and system fonts
- Stretching and compressing of any area
- Pixel editing via zoom facility
- Up to A4 page design
- No special disc format
- Four fonts provided
- Font Designer supplied
- Built-in Graphic Designer
- Import text or type direct
- Can import cut-outs
- Built-in Mode converter



EGYPT

The Gift of the Nile

Adventist Computer User Group

Adventist Computer User Group

Database Publications' DTP

5.25in DFS 40/80 track disc (only) £14.95

Due to the complexity of the program the fill routines will not function correctly with the B+, Master or Compact – all other features are compatible.

Place your order today, using the form on Page 119

Applying the big squeeze

£10 Prize letter

EVERY so often you run into the problem of added extra spaces to type-in listings, resulting in the dreaded No room *error. Getting rid of all those extra spaces can be a real problem and very boring, so here's a routine that will squeeze your programs until the pips squeak.*

Not only can it remove all extra spaces but it will also delete lines which contain REM statements, just delete comments but leave the REM or remove leading spaces on every line – or any combination of these.

Type it in and save it then run it – making your deletion choices – then load the program to be squeezed and press function key 1 – and moments later your program is shorter.– **Timothy Hall, Welshpool, Powys.**

```
   10 REM Program Squeezer
   20 REM by Timothy Hall
   30 REM (c) The Micro Us
er
   40 CFLG=&76:DFLG=&77
   50 COM=&78:CODE=&900
   60 *KEY1 CALL &900|M
   70 MODE7:PRINT'SPC(9)"P
rogram Squeezer"
   80 PRINT SPC(9)"
       "
   90 VDU 28,0,24,39,4
  100 PRINT "1. All spaces
"'"2. REMs + comments"
  110 PRINT "3. All spaces
,REMs + comments"'"4. Comm
ents"
  120 PRINT "5. All spaces
,Comments"'"6. Leading spa
ces"
  130 PRINT "7. REMs + com
ments,Leading spaces"'"8.
Comments,Leading spaces"
  140 REPEAT
  150 INPUT TAB(13,13)"Ent
er Choice ",A%
  160 UNTIL A%>0 AND A%<9
  170 IF A%>5 THEN B%=(A%-
4):A%=A%+B%
  180 FOR L%=0 TO 2 STEP 2
  190 P%=CODE:[OPT L%
  200 STA COM:LDA &18
  210 STA &71:STA &73
  220 LDA #0:STA &70
  230 STA &72:LDY #1
  240 JMP L3
  250 .L2 TYA
  260 LDY #3:STA (&70),Y
  270 TAY:CLC
  280 ADC &70:STA &70
  290 LDA &71:ADC #0
  300 STA &71:TYA
  310 .L25 CLC
  320 ADC &72:STA &72
  330 LDA &73:ADC #0
  340 STA &73:LDY #0
  350 JSR MVEBYTE
  360 .L3 LDX #0
  370 STX RFLG:STX QFLG
  380 STX CFLG:STX DFLG
  390 JSR MVEBYTE:CMP #255
  400 BNE L35:RTS
  410 .L35 JSR MVEBYTE:JSR
MVEBYTE
  420 .L4 LDA (&72),Y
  430 CMP #13:BEQ L2
  440 BIT RFLG:BMI BUMP
  450 BIT DFLG:BMI L5
  460 CMP #&F4:BEQ RM
  470 CMP #34:BEQ QUOTE
  480 CMP #&DC:BNE L43
  490 DEC DFLG
  500 .L43 CMP #32
  510 BNE L5:LDA COM
  520 AND #9:BEQ L5
  530 AND #1:BNE L45
  540 BIT CFLG:BMI L5
  550 .L45 BIT QFLG
  560 BPL BUMP
  570 .L5 JSR MVEBYTE
  580 CMP #32:BEQ L4
  590 LDA #255:STA CFLG
  600 JMP L4
  610 .BUMP INX
  620 INC &72:BNE L4
  630 INC &73:BNE L4
  640 .MVEBYTE
  650 LDA (&72),Y
  660 STA (&70),YINY:RTS
  670 .QUOTE LDA QFLG
  680 EOR #255:STA QFLG
  690 JMP L5
  700 .RM LDA COM
  710 AND #6:BEQ L5
  720 AND #2:BEQ RM3
  730 BIT CFLG:BPL RM2
  740 DEC RFLG:DEY
  750 JMP BUMP
  760 .RM2 LDY #3
  770 STX RFLG:LDA(&70),Y
  780 SEC:SBC RFLG:JMP L25
  790 .RM3 DEC RFLG
  800 JMP L5:]:NEXT:CLS
  810 PRINT "Instructions:
-"'"1) Load Program"'"2) P
ress 'f1'"'"3) Save Progra
m"':END
```

Multiple screen loading

*I HAVE been both a devoted reader of your excellent magazine and enthusiastic programmer for some time. Just recently I have turned my attention towards creating simple Basic games. One of my most recently acquired techniques has been *SAVEing Mode 5 screens then *LOADing them into my programs to create the games screens.*

What I would like to do is *LOAD several screens into the memory then CALL them up when they are needed. How would I go about doing this? – **Henry Coles, Keighley, West Yorks.**

● Unless your screens are very tightly compacted – or you're using the Master's sideways ram – you won't be able to have more than two screens loaded at one time which will occupy a total of 20k. There's certainly no easy way of doing what you want.

Sideways ram in action

I HAVE a BBC B+ and am a newcomer to the Beeb. While I understand using shadow ram for the screen, the 12k of sideways ram in the B+ seems to be all but useless. Will you please settle the question, can I load rom images to the B+ sideways for me? – **Ron Maitland, Great Sutton, South Wirral.**

● The answer to your question is both yes and no. You certainly can load rom images into this area but they have to be a maximum of 12k in length and are not handled properly by the operating system.

You cannot use normal utility roms as the operating system won't page it when unknown commands are issued and most laguages are bigger than 12k in length. If you do load a language into this area it can only be entered using:

```
*FX142,128
```

However the best use for this area is as an expanded printer buffer. The best book covering details about what's available on the B+ is *The New Advanced User Guide* by Mark Holmes and Adrian Dickens, published by Adder Publishing, ISBN 0 947929 05 3.

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

And back in Vuppy land

ANYONE who used Peter Harris' excellent Vuppy printer driver program from the September 1989 issue of The Micro User *may have come across the same problem as myself.*

When using highlight char-

➤

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

acters within the text, View will justify the line one extra space to the right per highlight character.

This happens because View assumes that the highlight character is not to be printed, but needs to be shown to exist on the screen.

However, if the highlight characters have been redefined to produce German umlauts or French special characters instead, the program will justify them incorrectly, making the text look untidy.

Is there any way round this? – **Jonathan Dickson, Mill Hill, London.**

● Do any readers have suggestions as to what Jonathan can do?

Getting faster graphics

I HAVE recently been experimenting with the graphics on my BBC B. I have created some quite sophisticated pictures, just using the Basic graphics commands.

I now want to transfer these programs into machine code equivalents, but can't see how to do it. I would just like to know how to GCOL, DRAW and MOVE in machine code. – **P.R. Watts, Edgbaston, Birmingham.**

● The Basic graphics commands simply evaluate the numbers then send instructions to the VDU drivers – so you don't need to use DRAW and PLOT at all even in Basic. For example all these have the same effect:

```
MOVE 0,0:DRAW 100,100
PLOT4,100,100:PLOT5,100,100
VDU25,4,100;100;:VDU25,5,100
;100;
```

In the last one the semi-colons are needed because VDU normally sends single byte numbers – between 0 and 255 – but screen coordinates can be much larger and two-byte numbers are required. The semi-colon ensures that the previous number is sent as two bytes.

The move from here to machine code is fairly simple. You need to be able to store the codes – like the VDU ones above – you want in memory and then send them one at a time to the VDU drivers.

The short program below illustrates the techniques and routines you can use:

```
 10 REM VDU Demo
 20 DIM code 256
 30 oswrch=&FFEE
 40 FOR L%=0 TO 3 STEP 3
 50 P%=code:[OPT L%
 60  LDX #0
 70 .outLoop
 80  LDA start,X
 90  JSR &FFEE
100  DEX:CPX #(end-start)
110  BNE outLoop:RTS
120 .start
130  OPT FNmove(0,0)
140  OPT FNdraw(100,100)
150 .end:]:NEXT
160 CALL code:END
170 DEF FNmove(X%,Y)
180 =FNplot(4,X%,Y%)
190 DEF FNdraw(X%,Y%)
200 =FNplot(5,X%,Y%)
210 DEF FNplot(K%,X%,Y%)
220 [OPT L%
230  OPT FNb(25):OPT FNb(K%)
240  OPT FNw(X%):OPT FNw(Y%)
250 ]:=L%
260 DEF FNb(B%):?P%=B%
270 P%=P%+1:=L%
280 DEF FNw(W%):!P%=W%
290 P%=P%+2:=L%
300 DEF FNgcol(K%,C%)
310 [OPT L%:OPT FNb(18)
320  OPT FNb(K%):OPT FNb(C%)
330 ]:=L%
```

This technique only works with fixed coordinates because it does not allow you to calculate new ones

Many ways of saving data

AT school we have an Archimedes 420/1 with a single floppy drive and a single hard drive with which we have a slight problem.

In the user guide it says that you must backup the hard disc occasionally, but on the pop-up menu for the hard disc on the icon bar the command backup is in grey and cannot be accessed.

We cannot work out why this is and so can't backup the hard drive. I hope you can help because no one here can fathom out the cause. – **Martin Booth, Hertford, Herts.**

● It is vitally important to back up your hard disc, unfortunately it's not the simple operation that it is for a floppy – remember you have up to 40Mbytes of data and one floppy will only take 800k maximum. However there are ways of doing it:

The simplest but most long-winded way is simply to copy files from the hard disc to a set of floppies one by one – but it's not really recommended.

A number of commercial utilities will do it; these have the advantage of cramming as much data as possible on to each floppy disc.

There are also utilities available from public domain libraries, so check out their adverts and our new PD page.

The final method – one used by professional companies – is to get a SCSI (pronounced *scuzzie*) interface and buy a tape streamer which will take the entire contents of the disc in one go. However they are very expensive.

In the Risk business

WITH reference to the letter from K. H. Brooks in the March issue of The Micro User regarding a computerised version of the game Risk. I have a tape version of a similar game – Apocalypse – which may interest him. It's is a cross between Risk and some of the early board war games.

However I was wondering if anyone could help enlighten me on the whereabouts of a supplier who could provide me with a disc copy of it, as I believe the original supplier – Command Software – is no longer trading. – **K. Barnes, North Shields, Tyne & Wear.**

Final verdict on UIM

I AGREE with Mr. Salt in your March issue that U.I.M. will never even approach Elite in playability, enjoyability and value.

After playing it, I concluded a number of things. Full marks to the programmers for the complexity of ideas but the game contains a boredom factor which rates at maximum in my opinion.

Between Christmas and New Year I must have spent about 24 hours playing U.I.M. and feel that I gave it a good go. The verdict I found though, matches exactly that of Mr. Salt. – **Cmdr C. Rutherford (Elite), Ringwood, Hampshire.**

● It's clear from the letters we've received that feelings about U.I.M. are very mixed about 50/50 – some people find it as addictive and interesting as Elite, others do not rate it at all.

Any readers who want to make their views known to those who matter should write directly to The 4th Dimension, PO Box 4444, Sheffield, S3 8NN.

Dealing with decimals

WHILE it's possible to produce numbers to two decimal places by setting @% to &2029, it also gives two decimal places to all other numbers output to the screen whether wanted or not.

One answer is to convert numbers not requiring decimal places to strings with STR$ before outputting to the screen.

But better than this why not have a special two-decimal *place conversion routine for printout? The following pair of functions take a number – with or without decimal places – as a parameter and return it as a string rounded up or down as appropriate to two decimal places. One function calls the other when required:*

```
DEF FNround(n)
LOCAL add,len,decimal,n$
n$=STR$(n)
REPEAT
decimal=INSTR(n$,".")
len=LEN n$
IF decimal=0 UNTIL TRUE:=
n$+".00"
IF len-decimal=1 UNTIL TR
UE:=n$+".0"
IF len-decimal=2 UNTIL TR
UE:=n$
add=10-VAL RIGHT$(n$,1)
IF VAL RIGHT$(n$,1)>5 n$=
FNadd(n$,add):UNTIL FALSE
n$=LEFT$(n$,len-1)
UNTIL FALSE
DEF FNadd(n$,add)
LOCAL add$,L%:add$="."
FOR L%=decimal+1 TO len-1
add$=add$+"0":NEXT
add$=add$+STR$(add)
=STR$(EVAL(n$+"+"+add$))
```

The resulting string can be precisely positioned with:

```
n$=FNround(33.457)
PRINTTAB(X-LENn$)n$
```

where X is the horizontal tab position.

This seems to work OK but, some numbers are not rounded up exactly as expected. Add the following short test program to the beginning:

```
 10 REPEAT:CLS
 20 PRINT"Press
alone to the end
 30 INPUT''Enter a decima
l number ";number
 40 IF number=0 UNTILTRUE
:@%=&90A:END
 50 percent=15
 60 pc=number/100*percent
 70 total=number+pc
 80 n$=FNround(number)
 90 pc$=FNround(pc)
100 t$=FNround(total)
110 PRINT:PRINT
120 PTINTTAB(2)"Rounded n
umber"TAB(30-LENn$)n$
130 PTNTAB(2);percent"% o
f "n$" is "TAB(30-LENpc$)
pc$
140 PRINTTAB(30-LENt$)STR
ING$(LENt$,"=")
150 PRINTTAB(2)"Rounded t
otal"TAB(30-LENt$)t$
160 PRINT''"Any key for a
nother"
170 REPEATUNTILGET
180 UNTIL FALSE
```

Run the program a few times to see the resulting output then try 123.99 at the prompt. You will find that the program hangs up and you will have to press Escape to get out of it. Now add:

```
PRINT n$;" ";
```

Immediately after the REPEAT in FNround and try again. You can see that the string pc$ will not round up.

The Master Reference Manual (part two) page L2-51 says this is due to inaccuracies in storing some numbers in binary. The manual also gives details of setting byte four of @% to modify the format of produced by STR$. Using this cured the problem. Add this line:

```
5 @%=&100090A
```

and run the program with 123.99 again – it now works. – **E. Ellis, Mirfield, West Yorks**

Mastering the Risc OS

WITH reference to G. Dryawood's letter in your December 1989 issue, if you issue this command:

```
*CONFIGURE Country Master
```

on your Archimedes or A3000 and then press Control+Break you will find that the £ sign is once more CHR$96. The change to the Master keyboard character codes can help in improving program compatability – it helps with Wordwise Plus, too.

It's also worth getting a copy of the latest version of !65Host, as it provides virtually complete emulation of the SOUND and ENVELOPE commands.

You can now use the Creative Sound programs – Parallel printer output and some DFS commands are also catered for, and there are new version of the printer drivers, floating point emulator and colour module – available from most dealers or Norwich Computer Services.

*A list of the different countries catered for can be obtained by tuping *COUNTRIES. This is not given in the User Guide.* – **W. R. Davis, Alsager, Stoke-on-Trent.**

● To get a complete list of every command available on your Risc OS machine hit f12 and type:

```
*spool Commands
*help .
*spool
*L = *settype Commands text
```

You'll get a very long list in text file which can be loaded into !Edit or your word processor.

Spaced out in Monster muddle

THE November 1989 issue of The Micro User *contained the game Monster Maze which I typed it into my Basic II BBC B. The checksums agreed except for the addition of stars at the end of some checksums. But when run the program only printed "Please Wait" and that was that.*

A friend loaned me a copy of the subscription disc containing the same program and this worked perfectly. To check, or rather compare my entries with these on the disc, both printed out and mine checked perfectly. Please explain why my program doesn't work? – **Miss M.B. McLeod, Wokingham, Berks.**

● As you noticed your checksums had asterisks tagged on the end, and this is where the crucial difference lies. An asterisk means that there is one or more spaces at the end of a line and – I would guess – you've typed a space at the start of every line too. Of course one extra space here or there means nothing, but in a 500 line program just one extra per line will use up half a k, two more result in a whole k and so on.

With games it is often crucial that no extra spaces are typed in. You can use the space-stripping routine in these Letters pages to shorten your program to the correct length.

Pounds on a Citizen

I HAVE a Citizen 129D dot matrix printer and have had difficulty in printing out the £ symbol. On reading the instruction manual I came up with a solution in the form of the following short program.

```
10 *FX 3,10
20 PRINT CHR$(27)+"R"+C
HR$(3)
30 *FX 3
```

This will initialise the printer to print out the pound sign whenever a hash is discovered in the text. I hope this is of use to other readers with this printer – **A.L.Oakey, Castleford, West Yorkshire.**

Finding space in Basic

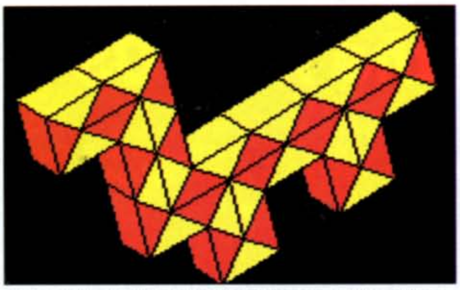
I AM writing a program which needs to store strings in memory using the $ operation, but I don't know what areas of memory are safe.

I have looked around the memory map and keep finding the MOS or Basic or a program or file and am not sure where I can put it without it being corrupted. – **E. MCKay, Penryn, Cornwall.**

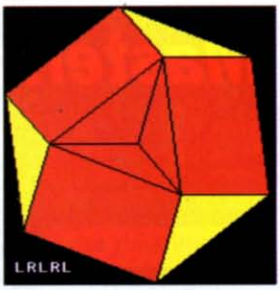
● There really isn't any *safe* area of memory but you can use Basic to give you some of its memory which it will not then use – let's say you want 256 bytes, just issue the following command in your initialisation routine:

```
DIM b% 256
```

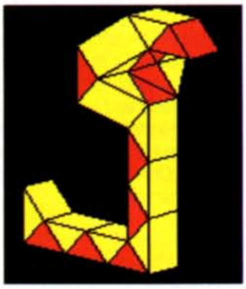
Notice the lack of brackets. The variable *b%* now contains the address of the first location of a 256 byte block of data. You must be very careful not to exceed the limit, otherwise you'll overwrite Basic variable workspace and very strange errors will be generated.



DUDUUDUDDUDUUDUDUUDDDDDDDUDDDUDDUUDUDDD



LRLRL



UDDDDUDDDDLDRLURDRD

Snake Magic

A fascinating pastime is expanded in this type-in program by Jim Paterson

OVER the years Professor Rubik has introduced several fascinating puzzles starting more than 10 years ago with the famous Cube. Some of these – especially the Cube – have been the subject of programs.

One of the earlier inventions was not really a puzzle at all: It's the Rubik or Magic Snake, and consists of 24 triangular prisms which can be twisted with respect to each other to produce a large variety of shapes.

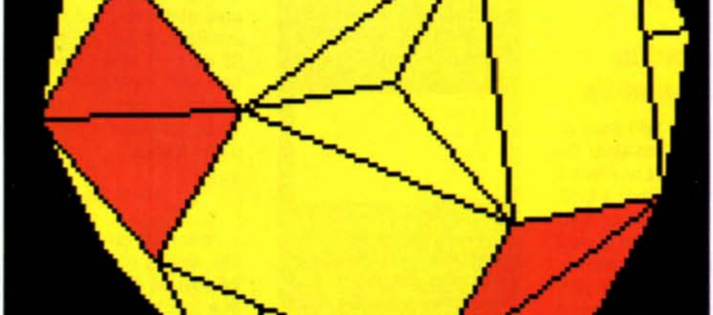
Here we have a program that allows you to build these figures and display them from any angle. And unlike the original, it's not restricted to 24 pieces – it can cope with any number from 1 to 40, vastly increasing the variety that can be produced. In order to input the details of all the twists and turns the program uses a notation first presented in the book *Shaping Rubik's Snake* by Albie Fiore (published by Penguin books). This notation consists of a letter to show the nature of the twist at each joint of the snake: Either D, U, R or L for Down, Up, Right or Left respectively. So to configure a standard snake consisting of 24 pieces you need a string of 23 letters for each of the joints.

Each piece is shaped like a cube which has been cut in half through two opposite edges. Now imagine that the piece is laid down with the cut rectangular face at the bottom with the next piece facing towards you. Then orient this second piece according to the edge where two squares of the cut cube meet:

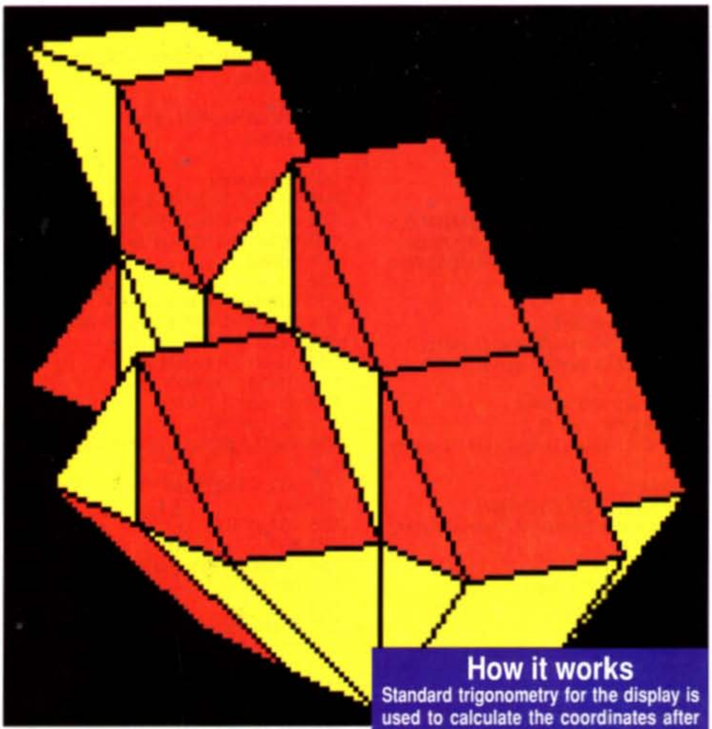
Down is when this apex edge of the second piece is at the bottom, *Up* when it is at the top, and so on. You can experiment by inputting a single letter and viewing the results until you feel confident about what each letter does.

To fold the snake – given a string of letters – you must start at one, say the light-coloured one, and execute each twist in turn. Type in the listing, ensure you've made no typing errors using the checksums and save it as Snake. When it's run it is in Display mode and will draw the standard 24 piece snake in the packaged ball shape.

In this mode you can use the cursor keys to rotate the snake around its centre about the X and Y axes and the < and > keys to rotate it about the Z axis. Normally



LRLRRLRLLRRLLRLRRLRLLRR



DDUDUDDULRRULRDRLURRLDU

each rotation is 15° but can be increased to 30° if Shift is also pressed, or reduced to 5° if Control is held down.

Using combinations of these keys you should be able to rotate the snake figure in order to view it from virtually any angle. Other keys which can be used in Display mode are X, Y and Z which will show the straight-on views along these axes and the spacebar which will toggle the light and dark pieces of the snake.

Pressing Tab puts the program into Input mode, where the generating string can be changed by moving to a particular character using the cursor left and right keys and then overtyping with either D, U, R or L.

The spacebar can be used to terminate the string by erasing all characters to the right. The maximum string length is 39 in order to allow snakes of up to 40 pieces.

Pressing Return when the string is completed returns the program to Display mode and your new creation will appear. The previous viewpoint will be remembered, but the scale might need to be adjusted to fit the new snake on to the screen.

The software also tests for impossible shapes that try to intersect themselves. If this is detected a message highlights the letter that could not be interpreted and returns the program automatically to Input mode so that the offending character can be changed.

This program remembers one of the more neglected Rubik puzzles, whose handling gives you a feeling for three dimensional geometry. It also extends the concept to a puzzle with any number of pieces so enlarging the repertoire of figures which can be produced. Although sample figures can be found in Fiore's book, a few minutes' experimentation can uncover a wide variety of interesting shapes.

How it works

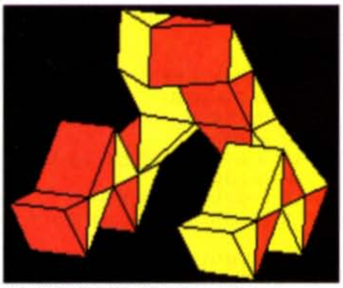
Standard trigonometry for the display is used to calculate the coordinates after each rotation but economises by noting that all the cubes, of which each piece is a half, have the same orientation.

The program also sorts along the Z axis, drawing the rear pieces first and working forwards so that overlapping takes place properly. In addition, only the front faces of each piece are drawn – the rear ones won't be seen. Note though that some front faces may eventually be hidden by other pieces nearer the front. Each face is outlined to make it stand out.

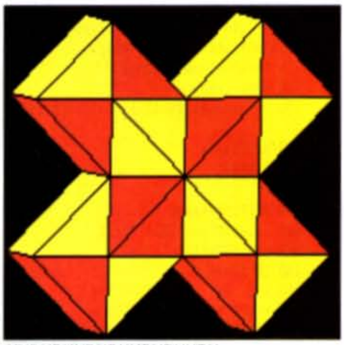
A few tables are encoded in the 24 character strings initialised at the begining of the program.

This is because there happen to be 24 possible orientations of a piece within its cube if the order is considered to be important. These tables are used to:

Table	Purpose
A	Find the relative position and orientation of each piece.
B, C	Work out the coordinate and sign of the square faces of the pieces.
D	Produce a code to indicate whether two pieces fit together to make a cube or intersect in an impossible configuration.



UDUDURDRDDRULDDLDLUDUDU



UUDUDUUDUDUUDUDUUDU

```
 10 REM Magic (Rubik) Snake
 20 REM by Jim Paterson
 30 REM (c) The Micro User
 40 :
 50 ON ERROR GOTO 350
 60 A$="ROWJLUMTSDVEGXBQPAIHFKCN"
 70 B$="424224244141141421211212"
 80 C$="011001100011110010011001"
 90 D$="ABCDKLIJEIFBDHKGFLHCAGJE"
100 N=39:DIM O%N,V%(N),D(N),Z%N
110 DIM N%3,d(2),min(2),max(2)
120 DIM u(2,2),C(7,2)
130 MODE1
140 C%=1:PROCcolours
150 VDU23,1,0;0;0;0;29,640;540;
160 T$="LRLRRLRLLRRLLRLRRLRLLRR"
170 $Z%=T$+STRING$(N-LEN(T$)," ")
180 PROCexpand:PROCview(2)
190 *FX4,1
200 :
210 REPEAT
220 IF INKEY-26  PROCturnu(1,-1)
230 IF INKEY-122 PROCturnu(1,1)
240 IF INKEY-42  PROCturnu(0,1)
250 IF INKEY-58  PROCturnu(0,-1)
260 IF INKEY-103 PROCturnu(2,-1)
270 IF INKEY-104 PROCturnu(2,1)
280 IF INKEY-67  PROCview(0)
290 IF INKEY-69  PROCview(1)
300 IF INKEY-98  PROCview(2)
310 IF INKEY-99  PROCcolours
320 IF INKEY-97  Q%=0:PROCinput
330 UNTILFALSE
340 :
350 MODE 7
360 REPORT:PRINT" at line ";ERL
370 *FX4,0
380 END
390 :
400 DEFPROCinput:E$="     ":U%=0
410 *FX15,1
420 REPEAT:R%=0
```

➤

➤

```
  430 COLOUR0:COLOUR131
  440 H$=CHR$(Z%?Q%)
  450 PRINTTAB(Q%,31)H$;
  460 G=INKEY(0)
  470 IF G>96 AND G<128 THEN G=G-32
  480 G$=CHR$G
  490 IF G=136 AND Q%>0 R%=-1
  500 IF G=137 AND Q%<N-1 AND H$<>" " R%
=1
  510 IF INSTR("DRUL ",G$)=0 G$=H$ ELSE
E$="      ":IF Q%<N-1 AND G$<>" " R%=1
  520 Z%?Q%=ASC(G$)
  530 COLOUR3:COLOUR128
  540 PRINTTAB(U%,30)E$;
  550 PRINTTAB(Q%,31)G$;
  560 IF G$=" " $(Z%+Q%)=STRING$(39-Q%,"
 "):PRINTTAB(Q%,31)$(Z%+Q%);
  570 Q%=Q%+R%:UNTIL G=13
  580 PROCexpand
  590 IF Q%<>255 U%=Q%-3:E$="ERROR":GOTO
 410
  600 PROCscale
  610 ENDPROC
  620 :
  630 DEFPROCexpand
  640 ?O%=0:V%(0)=2631720:J%=0
  650 L%=INSTR($Z%," ")-1
  660 IF L%=-1 L%=N ELSEIF L%=0 GOTO770
  670 FOR I%=1 TO L%:P%=O%?J%
  680 M%=P% MOD 4:D%=P% DIV 4
  690 W%=256^(D%DIV2)
  700 IF D%MOD2=1 W%=-W%
  710 V%(I%)=V%(J%)+W%
  720 W$=CHR$(Z%?(I%-1))
  730 M%=(M%+INSTR("DLUR",W$)-1)MOD4
  740 O%?I%=ASC(MID$(A$,D%*4+M%+1,1))-AS
C("A")
  750 J%=I%
  760 NEXT
  770 Q%=255
  780 FOR J%=0 TO 2:min(J%)=100:max(J%)=
0:NEXT
  790 FOR I%=0 TO L%:!N%=V%(I%)
  800 IF I%=0 GOTO 840
  810 FOR K%=0 TO I%-1
  820 IF V%(I%)=V%(K%) AND ASC(MID$(D$,O
%?I%+1,1))+ASC(MID$(D$,O%?K%+1,1))-ASC("
A")-ASC("A")<>11 THEN Q%=I%-1:I%=L%:K%=L
%
  830 NEXT
  840 FOR J%=0 TO 2
  850 IF N%?J%<min(J%) min(J%)=N%?J%
  860 IF N%?J%>max(J%) max(J%)=N%?J%
  870 NEXT,
  880 IF Q%<>255 ENDPROC
  890 d=0:FOR J%=0 TO 2
  900 d(J%)=(max(J%)-min(J%)+1)/2:d=d+d(
J%)*d(J%)
  910 NEXT
  920 T%=S%:d=SQR(d):S%=480/d
  930 min=min(0)+min(1)*256+min(2)*256*2
56
  940 FOR I%=0 TO L%
  950 V%(I%)=V%(I%)-min
  960 NEXT
  970 ENDPROC
  980 :
  990 DEFPROCcolours
 1000 C%=4-C%:VDU19,1,C%;0;
 1010 C%=4-C%:VDU19,2,C%;0;
 1020 C%=4-C%
 1030 FOR I%=0TO1500:NEXT
 1040 ENDPROC
 1050 :
 1060 DEFPROCview(axis%)
 1070 FOR I%=0 TO 2:FOR J%=0TO 2
 1080 IF I%=(J%+axis%)MOD3 u(I%,J%)=S% E
LSE u(I%,J%)=0
 1090 NEXT,
 1100 PROCcoords:PROCdisplay
 1110 ENDPROC
 1120 :
 1130 DEFPROCscale
 1140 FOR I%=0 TO 2:FOR J%=0TO 2
 1150 u(I%,J%)=u(I%,J%)*S%/T%:NEXT,
 1160 PROCcoords:PROCdisplay
 1170 ENDPROC
 1180 :
 1190 DEFPROCturnu(axis%,sign%)
 1200 IF INKEY-1 a=PI/6 ELSE IF INKEY-2
a=PI/36 ELSE a=PI/12
 1210 cos=COS(a):sin=SIN(a)
 1220 c1%=(axis%+1)MOD3
 1230 c2%=(axis%+2)MOD3
 1240 FOR I%=0 TO 2
 1250 W=u(I%,c1%)*cos+sign%*u(I%,c2%)*si
n
 1260 u(I%,c2%)=u(I%,c2%)*cos-sign%*u(I%
,c1%)*sin
 1270 u(I%,c1%)=W
 1280 NEXT
 1290 PROCcoords:PROCdisplay
 1300 ENDPROC
 1310 :
 1320 DEFPROCcoords
 1330 FOR I%=0 TO 2
 1340 C(0,I%)=0
 1350 C(1,I%)=u(0,I%)
 1360 C(2,I%)=u(1,I%)
 1370 C(4,I%)=u(2,I%)
 1380 C(3,I%)=C(1,I%)+C(2,I%)
 1390 C(5,I%)=C(1,I%)+C(4,I%)
 1400 C(6,I%)=C(2,I%)+C(4,I%)
 1410 C(7,I%)=C(6,I%)+C(1,I%)
 1420 NEXT
```

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 9719 9
  50 = 7AE9 3
  60 = 8E75 7
  70 = 8768 F
  80 = E899 4
  90 = 7C28 5
 100 = AD90 2
 110 =  CF0 B
 120 = 5312 A
 130 = EA3A 4
 140 = C7A3 8
 150 = BF4D 4
 160 = B91D 3
 170 = D0A5 6
 180 =  9F8 B
 190 = E383 0
 200 = 9719 E
 210 = BFBA E
 220 = 7E17 2
 230 = 86C5 7
 240 = 594D 9
 250 = 4DF7 7
 260 = E5B7 A
 270 = 64B0 7
 280 = CCD6 D
 290 = AC9D F
 300 = 3264 6

 310 = F5E4 8
 320 = 2AA6 6
 330 = E014 4
 340 = 9719 A
 350 = 1092 9
 360 = 6BDF 7
 370 = F3A2 0
 380 = FD2E 6
 390 = 9719 5
 400 = 8C24 1
 410 = 7CA7 C
 420 = 2802 7
 430 =  408 2
 440 = C8E4 B
 450 =  837 0
 460 = DD93 D
 470 = F756 1
 480 = 5C85 0
 490 = 72FA 5
 500 = 9F28 5
 510 =    4 A
 520 = 6A50 5
 530 = 68F0 7
 540 = 7CD8 9
 550 = 2406 9
 560 = C2E1 0
 570 = A56B C
 580 = A6E0 2
 590 = 4267 4
 600 = F5B9 4

 610 = ED0F A
 620 = 9719 4
 630 = C661 6
 640 = AE33 7
 650 = 4CCA 5
 660 = 2583 F
 670 = 977F 6
 680 = 8E37 2
 690 = 2D84 4
 700 = DF83 B
 710 = 3EA0 4
 720 = DEDB 2
 730 = EC41 7
 740 = E378 D
 750 = 98AA A
 760 = 2C83 D
 770 = 3CEB 9
 780 = 8A95 1
 790 = 4A30 4
 800 = 3858 0
 810 = DC95 9
 820 = 1865 5
 830 = 2C83 C
 840 = D42B 1
 850 = 8633 4
 860 = 8B06 B
 870 = 8300 8
 880 = 1AD3 D
 890 = 4B3C 4
 900 = 9BDE 5
 910 = 2C83 A
 920 = B3CC 8

 930 = 9F9C E
 940 = D22C 4
 950 = 4F2B 9
 960 = 2C83 3
 970 = ED0F F
 980 = 9719 B
 990 = D2F2 8
1000 = 3B39 1
1010 = E3BB 2
1020 = 5024 A
1030 = 4142 A
1040 = ED0F B
1050 = 9719 E
1060 = D9C4 7
1070 = 3A26 C
1080 = 3881 A
1090 = 8300 D
1100 =  904 0
1110 = ED0F 1
1120 = 9719 5
1130 = 5EDD B
1140 = 3A26 4
1150 = 3D17 2
1160 =  904 6
1170 = ED0F 3
1180 = 9719 A
1190 = C77B B
1200 = 981D 3
1210 = 349C 0
1220 = EB5D D
1230 = FD22 B
1240 = 1C5E 8

1250 = 5A59 E
1260 = 137A F
1270 = 2E54 8
1280 = 2C83 E
1290 =  904 2
1300 = ED0F A
1310 = 9719 7
1320 = 7069 D
1330 = 1C5E E
1340 = 1F9B F
1350 = 7766 5
1360 = 1292 6
1370 = 732B 5
1380 = F1E6 7
1390 = E015 D
1400 = 418B 0
1410 = B287 5
1420 = 2C83 3
1430 = ED0F F
1440 = 9719 8
1450 = 94B9 A
1460 = 5529 2
1470 = D22C E
1480 = A536 C
1490 = D42B B
1500 = 9208 F
1510 = 8300 7
1520 = 7D68 6
1530 = 144B 1
1540 = 1663 C
1550 = 71BD 5
1560 = 2C83 8

1570 = E650 F
1580 = D59C 5
1590 = D42B 7
1600 = 6243 B
1610 =  1A0 D
1620 = 2C83 7
1630 = 740E E
1640 = 2C83 1
1650 = ED0F A
1660 = 9719 1
1670 = A0E2 D
1680 = 1CBC 0
1690 = 87FB C
1700 = 9444 C
1710 = AEE4 9
1720 = ED0F F
1730 = 9719 7
1740 = 6D0C 5
1750 = 6867 5
1760 = 4A24 0
1770 = B913 2
1780 = 331D 6
1790 = 19AB 0
1800 = 257C 9
1810 = 7CEA 0
1820 = ED0F 6
1830 = 9719 7
1840 = FE8D 7
1850 = 87FB F
1860 =  1B1 6
1870 = 26BA 9
1880 = D879 9

1890 =    0 9
1900 = 7BFE 3
1910 =    0 3
1920 = 2606 2
1930 = 4799 6
1940 = 9D54 3
1950 = ED0F F
1960 = 9719 0
1970 = 4A9B A
1980 = CE4A 9
1990 = 45B1 F
2000 = 4846 B
2010 = 84AF 2
2020 = EE63 1
2030 = 71BA 7
2040 = A50B 2
2050 = A8FC 9
2060 = A1A6 9
2070 = 49FA 4
2080 = ED0F E
2090 = 9719 8
2100 =  620 4
2110 = 313D 5
2120 = 8CCB 4
2130 = 9B31 E
2140 = ED0F 6
2150 = 9719 E
2160 = 3643 1
2170 = FFAF 3
2180 = 4259 F
2190 = 4972 D
2200 = ED0F B
```

```
1430 ENDPROC
1440 :
1450 DEFPROCdisplay:CLS
1460 PRINTTAB(0,31)$Z%;
1470 FOR I%=0 TO L%
1480 D(I%)=0:!N%=V%(I%)
1490 FOR J%=0 TO 2
1500 D(I%)=D(I%)+(N%?J%)*u(J%,2)
1510 NEXT,
1520 FOR G%=0 TO L%:MAXZ=-1000
1530 FOR K%=0 TO L%
1540 IF D(K%)>MAXZ I%=K%:MAXZ=D(I%)
1550 IF D(K%)=MAXZ PROCsamecube
1560 NEXT
1570 D(I%)=-1000:!N%=V%(I%)
1580 X=0:Y=0
1590 FOR J%=0 TO 2
1600 X=X+((N%?J%)-d(J%))*u(J%,0)
1610 Y=Y+((N%?J%)-d(J%))*u(J%,1)
1620 NEXT
1630 PROCdrawcube
1640 NEXT
1650 ENDPROC
1660 :
1670 DEFPROCsamecube
1680 IF V%(I%)<>V%(K%) ENDPROC
1690 PROCapex
1700 IF C(A1%,2)+C(A2%,2)>C(A1% EOR 7,2
)+C(A2% EOR 7,2) ENDPROC
1710 I%=K%:MAXZ=D(I%)
1720 ENDPROC
1730 :
1740 DEFPROCapex
1750 P%=0%?I%
1760 C2%=2^(P% DIV 8)
1770 S2%=1-(P% DIV 4)MOD 2
1780 C1%=VAL(MID$(B$,P%+1,1))
1790 S1%=VAL(MID$(C$,P%+1,1))
1800 C3%=7-C2%-C1%
1810 A1%=C1%*S1%+C2%*S2%:A2%=A1%+C3%
1820 ENDPROC
1830 :
1840 DEFPROCdrawcube
1850 PROCapex
1860 B%=I%MOD2+1
1870 E1%=A1% EOR C1%:E2%=A2% EOR C1%
1880 E3%=A1% EOR C2%:E4%=A2% EOR C2%
1890 REM square face
1900 IF C(A1%,2)+C(A2%,2)>C(A1% EOR 7,2
)+C(A2% EOR 7,2) THEN PROCshape(E1%,E2%,
E3%,E4%)
1910 REM triangular face
1920 IF C(C3%,2)<0 PROCshape(A2%,E2%,E4
%,E4%) ELSE IF C(C3%,2)>0 PROCshape(A1%,
E1%,E3%,E3%)
1930 IF I%=0 PROCsquare1
1940 IF I%=L% PROCsquare2
1950 ENDPROC
1960 :
1970 DEFPROCshape(a%,b%,c%,d%)
1980 GCOL 0,B%
1990 MOVE X+C(a%,0),Y+C(a%,1)
2000 MOVE X+C(b%,0),Y+C(b%,1)
2010 PLOT 85,X+C(c%,0),Y+C(c%,1)
2020 IF d%<>c% PLOT 85,X+C(d%,0),Y+C(d%
,1)
2030 GCOL 0,0
2040 DRAW X+C(b%,0),Y+C(b%,1)
2050 DRAW X+C(a%,0),Y+C(a%,1)
2060 DRAW X+C(c%,0),Y+C(c%,1)
2070 IF d%<>c% DRAW X+C(d%,0),Y+C(d%,1)
2080 ENDPROC
2090 :
2100 DEFPROCsquare1
2110 IF C(C1%,2)<=0 AND S1%=0 ENDPROC
2120 IF C(C1%,2)>=0 AND S1%=1 ENDPROC
2130 PROCshape(A1%,A2%,E3%,E4%)
2140 ENDPROC
2150 :
2160 DEFPROCsquare2
2170 IF C(C2%,2)<=0 AND S2%=0 ENDPROC
2180 IF C(C2%,2)>=0 AND S2%=1 ENDPROC
2190 PROCshape(A1%,A2%,E1%,E2%)
2200 ENDPROC
```

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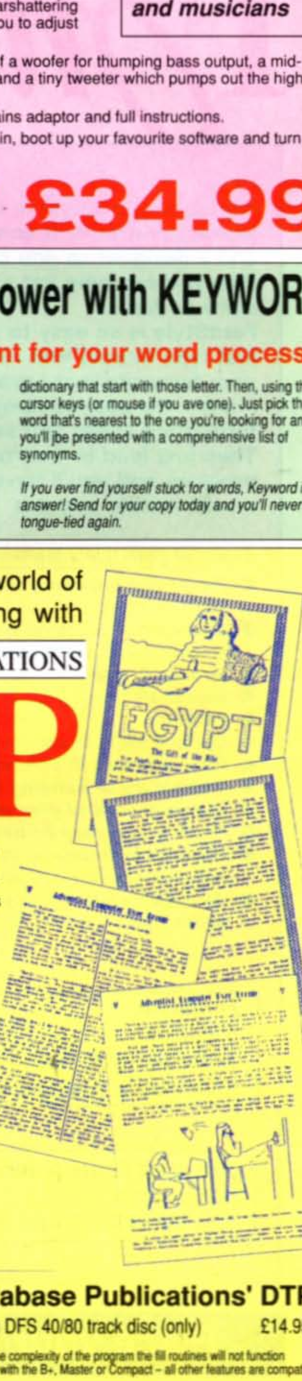

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- No special disc format
- Four fonts provided
- Font Designer supplied
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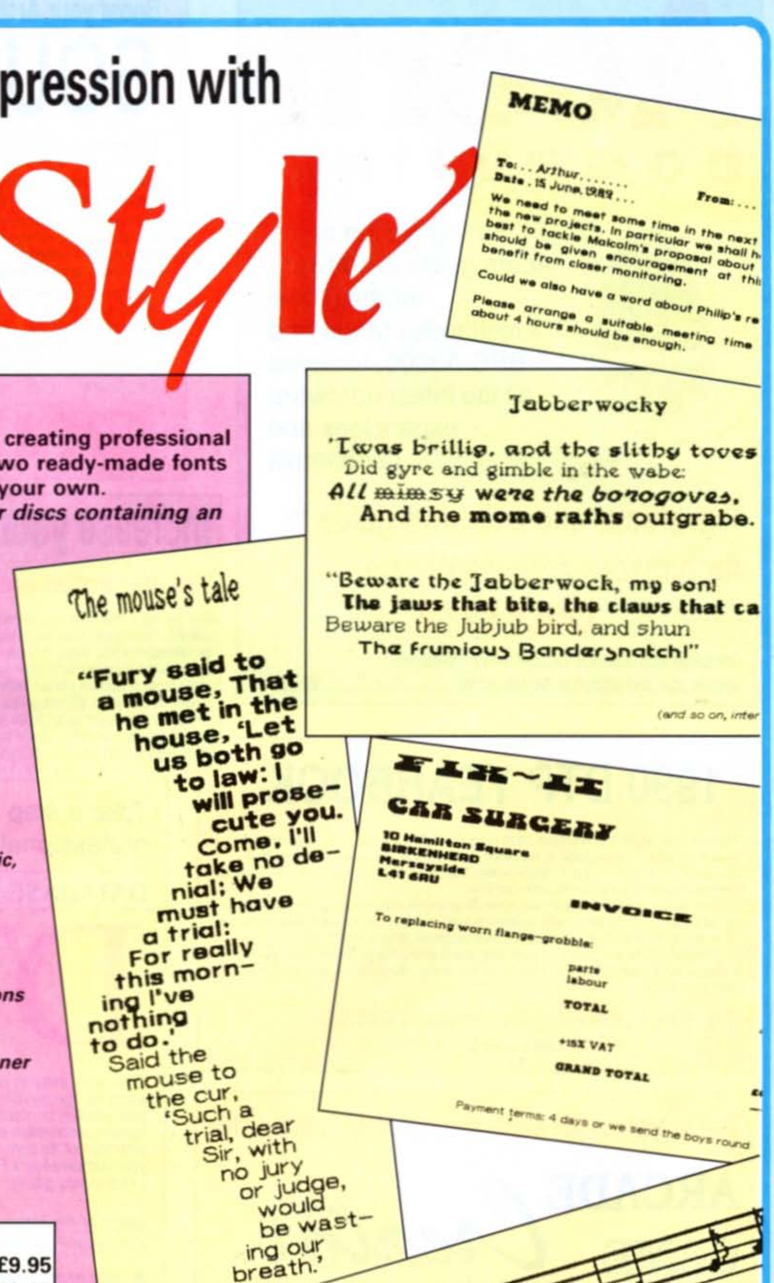

MEMO

To: .. *Arthur*.......
Date . 15 June 1989 ... **From:** ...

We need to meet some time in the next
the new projects. In particular we shall h
best to tackle Malcolm's proposal about
should be given encouragement at thi
benefit from closer monitoring.

Could we also have a word about Philip's re

Please arrange a suitable meeting time
about 4 hours should be enough.

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the **mome raths** outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

(and so on, inter

The mouse's tale

**"Fury said to
a mouse, That
he met in the
house, 'Let
us both go
to law: I
will prose-
cute you.
Come, I'll
take no de-
nial; We
must have
a trial:
For really
this morn-
ing I've
nothing
to do.'**
Said the
mouse to
the cur,
'Such a
trial, dear
Sir, with
no jury
or judge,
would
be wast-
ing our
breath.'
'I'll be
judge,
I'll be
jury,'
Said
cun-
ning
old
Fury:
'I'll
try
the
whole
cause,
and
con-
demn

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(see page 116)

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(see page 117)

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Keyword

(see page 117)

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(see page 117)

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(see page 116)

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(see page 116)

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(see page 116)

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(see page 117)

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Database Publications DTP

(see page 117)

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DTP Yearbook 1990

(see page 117)

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Forth Rom

(see page 116)

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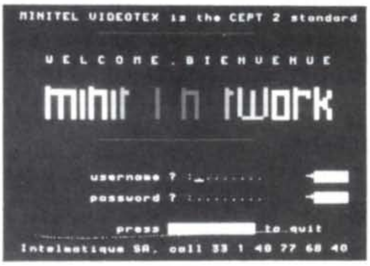

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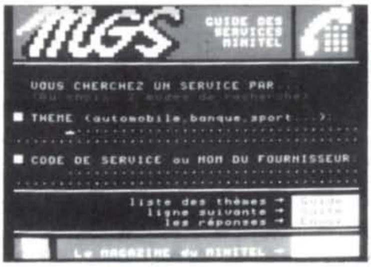

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  _..................................
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              liste des thèmes →
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```

And now Minitel is available in the UK via MinitelNet, which turns your BBC Micro into a fully functional Minitel workstation with direct connection to Paris.

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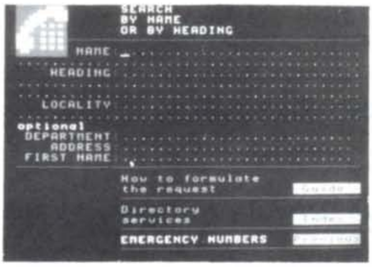

```
        SEARCH
        BY NAME
        OR BY HEADING
      NAME:_..........................
   HEADING:...........................
  LOCALITY:...........................
optional
DEPARTMENT:...........................
   ADDRESS:...........................
FIRST NAME:...........................
        How to formulate
        the request
        Directory
        services
        EMERGENCY NUMBERS
```

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From Page 33

```
  330 :
  340 DEF PROCtitle
  350 VDU19,3,6;0;:L=1:J=0
  360 COLOUR 129:GCOL0,2
  370 PROCangle:PROCdial
  380 COLOUR1:COLOUR131
  390 VDU28,0,31,7,0:CLS
  400 PRINTTAB(0,6)" * * * *SUNDIALS * *
 * *"'"by"'" Arthur  Harvey."
  410 PRINT'" Design your ownHorizon- ta
l or VerticalSundial,with the angles com
putedfor yourlatitude"
  420 GCOL0,0
  430 FOR C=0 TO 500 STEP 5:MOVE0,0:DRAW
0,500:PLOT85,C,500:NEXT
  440 Y(12)=0:PROCkey
  450 ENDPROC
  460 :
  470 DEF PROChorizontal:CLS:J=0
  480 INPUTTAB(3,12)"What is your Latitu
de (0-90):",L:IF L<0 OR L>90 GOTO 480
  490 L=RAD(L)
  500 D=0:F=0:H=0:G=L
  510 PROCangle
  520 ENDPROC
  530 :
  540 DEF PROCvertical:CLS:J=2
  550 INPUTTAB(3,12)"What is your Latitu
de (0-9Q):",L:IF L<0 OR L>90 GOTO 550
  560 INPUT'"What is the angle between t
he direction the Dial faces and the Sout
h (0-90):",D
  570 IF D<0 OR D>90 GOTO 560 ELSE IF D=
0 GOTO 600
  580 PRINT'"Is that to the East or to t
he West ? ";:K=GET:PRINT;CHR$(K)
  590 IF K=69 D=-D ELSE IF K<>87GOTO580
  600 PRINT'"Computing ..."
  610 L=RAD(L):D=RAD(D)
  620 F=ATN(SIND/TANL)
  630 G=-ASN(COSD*COSL)
  640 H=ATN(TAND/SINL)
```

PROCEDURES

title	Draws the title page
horizontal	Obtains latitude of horizontal dial
angle	Calculates angles and coordinates for horizontal dial
vertical	Obtains latitude and direction of vertical dial, calculatesangles and coordinates
list	Prints out data
dial	Draws dial
gnomon	Draws gnomon
dump	Screen dump program
key	Waits for keypress
error	Traps ESC and dividing by near zero. Reports other errors
FNface	Returns string of vertical dial direction

VARIABLES

A(20)	Stores the hour angles
X(20)	Stores the X coordinates
Y(20)	Stores the Y coordinates
L	Latitude
D	Direcition dial faces (vertical dial)
F	Angle between noon line and gnomon
H	Hour angle of the plane of the gnomon edge
G	Gnomon angle
J	0 for horizontal dial, 2 for vertical
Q	X coordinate for gnomon
P	Y coordinate for gnomon

Further reading

Anyone wishing to learn more about sundials should obtain a copy of Sundials by Frank W. Cousins. It gives both their history and details of various types.

```
  650 FOR C=4 TO 20
  660 A(C)=ATN(COS(D)*COS(L)*TAN(H-RAD(C
*15)))-F
  670 IF RAD(15*(C-12))<D-1.57 OR RAD(15
*(C-12))>D+1.57 Y(C)=1000:GOTO 710
  680 IFABS(A(C))>1.57Y(C)=1000:GOTO710
  690 Y(C)=-484/ABS(TANA(C)):X(C)=-484*S
GN(A(C))
  700 IF Y(C)<-930 X(C)=X(C)*-930/Y(C):Y
(C)=-930
  710 NEXT
  720 ENDPROC
  730 :
  740 DEF PROCangle
  750 PRINT'"Computing ..."
  760 FOR C=13 TO 20
  770 A(C)=ATN(TAN(RAD(15*(C-12)))*SINL)
  780 IF A(C)<=0 A(C)=A(C)+PI
  790 Y(C)=484/TANA(C):X(C)=484*SGN(L)
  800 IF Y(C)>667 X(C)=X(C)*667/Y(C):Y(C
)=667
  810 IF Y(C)<-297 X(C)=X(C)*-297/Y(C):Y
(C)=-297
  820 A(24-C)=-A(C):Y(24-C)=Y(C):X(24-C)
=-X(C)
```

➤

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 9621 1
  50 = 7054 A
  60 = 3DBC F
  70 = D814 D
  80 = 5255 2
  90 = E557 E
 100 = 7E62 F
 110 = 2A8C E
 120 = 4B9A F
 130 = 8CCB 4
 140 = 4713 6
 150 = F241 0
 160 = 1F71 B
 170 = 1FE5 C
 180 = 8206 E
 190 = F448 E
 200 = EE00 0
 210 = 36A5 2
 220 = B947 1
 230 =  BD6 8
 240 = 6E2E 5
 250 =  5C6 2
 260 =  2DE 1
 270 =  6DD F
 280 = 5FBC 2
 290 = 6A9A 4
 300 = 5F7F 6
 310 =  2DE C
 320 = 226C F
 330 = 9719 B
 340 = 5C22 0
 350 = BC60 4
 360 = 41CE B
 370 = A271 1
 380 = 41A8 A
 390 = 78E0 7
 400 = AADB F
 410 = 79AA 9
 420 = 130E 7
 430 = 893D E
 440 = FC76 C
 450 = ED0F 0
 460 = 9719 6
 470 = ACFC D
 480 = B92A 9
 490 = 8253 D
 500 = 4EFF 2
 510 = 3E46 6
 520 = ED0F 1
 530 = 9719 8
 540 = D921 A
 550 = E64A 7
 560 = D4B8 C
 570 = EA6A A
 580 = AD0C A
 590 = AE1E 4
 600 = 8037 3
 610 = D915 2
 620 = 8A15 C
 630 = 2D1C 6
 640 = 56C1 9
 650 = B2DB 6
 660 = 1E4C E
 670 =  8AC 5
 680 = 2C79 9
 690 = DA31 5
 700 = 4FC4 4
 710 = 2C83 D
 720 = ED0F 3
 730 = 9719 1
 740 = 3031 3
 750 = 8037 7
 760 = EB93 B
 770 = 917E 5
 780 =  44F B
 790 = EEBA 9
 800 = 9FA0 0
 810 = 752C 3
 820 = 38A5 5
 830 = 2C83 0
 840 = C54C 5
 850 = ED0F B
 860 = 9719 D
 870 = 95BA 2
 880 = 7AEF 9
 890 = 5C4E 5
 900 =  1AB 2
 910 = A105 2
 920 = E66E A
 930 =  F67 0
 940 = BAF2 2
 950 = 9EFD 4
 960 = FF3E 6
 970 = B2DB D
 980 = CFEF C
 990 = C180 5
1000 = 2C83 D
1010 = 43C2 F
1020 = ED0F B
1030 = 9719 6
1040 = E651 F
1050 = 3847 9
1060 = 84EA D
1070 = 4ED4 D
1080 = 7FF7 F
1090 = 9AE6 0
1100 = B2DB E
1110 = 7FD0 6
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1130 = 85F7 D
1140 = 2C83 0
1150 = ED0F 5
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1240 = 584A 1
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1280 = 9719 A
1290 = 4683 7
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1310 = ED0F 2
1320 = 9719 9
1330 = 8D64 E
1340 = 5D9A 4
1350 = 3C8F 4
1360 = 9719 8
1370 = 90B3 C
1380 = B21F 0
1390 = 43D2 5
1400 = 9719 6
1410 = 72B4 B
1420 = 6534 C
1430 = A7DF 9
1440 = F06A 0
1450 = FD2E C
```

➤

```
  830 NEXT
  840 Y(12)=667
  850 ENDPROC
  860 :
  870 DEF PROClist
  880 IF J=0 PRINT"  DATA FOR HORIZONTAL
 DIAL"''"Latitude and",DEG(L)" Degrees"'
"Angle of Gnomon":GOTO 930
  890 PRINT"  DATA FOR VERTICAL DIAL"''T
AB(28)"Degrees"
  900 PRINT"Latitude"TAB(21)DEG(L)'"Faci
ng "FNface TAB(21)ABS(DEG(D))
  910 PRINT"Gnomon Angle"TAB(21)DEG(-G)
  920 PRINT"Noon line to Gnomon"TAB(21)D
EG(-F)
  930 IF ABS(G)<.1 G=G/0
  940 PRINT'TAB(9)"HOUR"TAB(19)"DEGREES"
  950 PRINTTAB(16)"(from Noon line)"
  960 PRINT
  970 FOR C=4 TO 20
  980 IF Y(C)=1000 GOTO 1000
  990 PRINT C,DEG(A(C))
 1000 NEXT
 1010 PRINT'"Negative angles indicate an
ti-clockwise."
 1020 ENDPROC
 1030 :
 1040 DEF PROCdial
 1050 CLS:VDU29,779;500;
 1060 FOR C=0 TO 12 STEP 6:E=500-C^2
 1070 MOVEE,E:DRAWE,-E:DRAW-E,-E
 1080 DRAW-E,E:DRAWE,E:NEXT
 1090 IF J=0 VDU29,779;330; ELSE VDU29,7
79;964;
 1100 FOR C=4 TO 20
 1110 IF Y(C)=1000 GOTO 1140
 1120 MOVE0,0:DRAWX(C),Y(C)
 1130 PLOT0,16,0:VDU5,8:IF C<13 PRINTSTR
$(C) ELSE PRINTSTR$(C-12):VDU4
 1140 NEXT
 1150 ENDPROC
 1160 :
 1170 DEF PROCgnomon
 1180 P=260/TANG:IF J=0 AND P>631 P=631
ELSE IF P<-928 P=-928
 1190 Q=P*TANG
 1200 MOVE-520,0:DRAW-520,P:DRAW-520-Q,P
:DRAW-520,0
 1210 MOVE0,0:PLOT18,-P*TANF,P
 1220 GCOL0,3:VDU4
 1230 PRINTTAB(0,22-
J)"Latitude"'" = ";D
EG(L)'"degrees."
 1240 IF J=0 ENDPROC
 1250 PRINT"Facing"
 1260 PRINT;ABS(DEG(D))'FNface
 1270 ENDPROC
 1280 :
 1290 DEF PROCdump
 1300 *GIMAGE EPS R1 H&C0 V&CD
 1310 ENDPROC
 1320 :
 1330 DEF FNface
 1340 IF D=0 =" South"
 1350 IF D<0 =" East" ELSE =" West"
 1360 :
 1370 DEF PROCkey:*FX21
 1380 PRINT:PRINT"Press"'" any key"
 1390 VDU7:K=GET:CLS:ENDPROC
 1400 :
 1410 DEF PROCerror
 1420 VDU3:IF ERR=17 GOTO 90
 1430 IF ERR=18 PRINT'"Gnomon angle too
small at this latitude.":Y(12)=0:PROCkey
:CLS:GOTO 100
 1440 CLS:REPORT:PRINT" at line ";ERL
 1450 END
```

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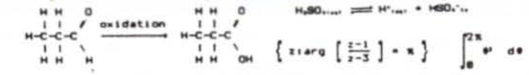

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DTP ☐

Recursion and the West Pole

The lighthearted saga of two micro addicts continues

Dear Trev

WHY AM I SHOUTING? I'M NOT, IT'S JUST THAT THE CAPS LOCK KEY IS stuck. Goooooot it! This keyboard is PlAYIlng up.

Mind you, that's not all. Andrea is as well. She's spending her time at home resting until she goes off on her "Women In Search Of The West Pole" expedition.

And before you say anything, I've informed her that there's only a North and South Pole and in return she's informed me that I have a typically negative male attitude to women's efforts and she's also informed me exactly what she's going to do with the West Pole when she finds it.

I think that A. is one of the bugs in the program of my life, though you could hardly call her a logical error. I must have been mad.

You know that all the books on structured programming say any program can be written using sequence, selection and repetition. Well, the authors must have got the idea off A. because that's how she's been running my life. It's a sequence of "Do this", "Do that", interspersed with "If I've told you once I've told you a thousand times" which combines both repetition and selection. I suppose recursion is represented by what she threatened to do with that pole.

The problem is that it looks like she won't be picked to be the first British person of the female persuasion to be launched into space – this despite the repeated requests from the Romchester Rogues.

She's just got back from her second interview and apparently the panel weren't too impressed by some of her answers. They didn't see much merit in her proposal to study the effects of weightlessness on campanology.

In fact they thought she was joking and told her to pull the other one. Which she very nearly did and since the other one was mine, I'm none too happy. Mind you she was pleased about the fact that her reaction times were the fastest of anyone they'd tested. As she said, "I always knew bellringers could go like the clappers."

Not that Doreen's attitude helped much. "I'd have thought they'd have had you," she purred,"I'm told you're an expert on free falls. Maybe it was the payload, though I'm sure weightlessness would become you. And after you had such high hopes. Still you must be used to coming down to earth with a bang".

A. just ignores her but gives me hell about it later. She refers to Doreen as "Your micro groupie", making dark remarks about the amount of hands-on experience she's had.

Doreen can take care of herself, though. When A. mentioned her women's group Doreen remarked that she'd heard that everyone had an equal opportunity with Andrea.

They last came face to face at a planning meeting for the latest issue of the Rogue's fanzine, RAM User. We were sat sitting at a table minding our own business, staring at the last few dregs of Boddards in our glasses and wondering who was going to crack first and buy the next drink – incidentally did you here about the drunken campanologist who always wanted one more round? – wondering what William the Wimp's badge meant. You remember William, the one who thought a syntax error was something to do with the community charge.

His badge read "Unix users love Vi" but no one understood what it meant and we didn't want to ask. I don't mind showing my ignorance but I'm wary about who I show it to.

"I think it's a multi-user system" hazarded D.

"Oh, like you?" A. whispered for all to hear.

At this point Clive cracked and headed for the bar while I tried to avert meltdown by bringing up the subject of the competition for RAM User. I'd thought of asking the lads at Database for some advice but as Clive said "What do they know about magazines?" Anyway everyone knows Micro User has no competition.

RAM User's, on the other hand, is a multiple choice quiz which most people choose to avoid. It's not surprising when you see some of the questions.

What is the RS232?

A. An airship which crashed on its maiden voyage.
B. A Clive Sinclair invention.
C. Something Mike Cook likes poking.

or

What is recursion?

A. Recursion.
B. Recursion.
C. Recursion.

Which reminds me. Clive is still confused over the difference between recursion and iteration. As he says:

"People tell me and I keep repeating it over and over but I still can't get it straight".

"Bob's got that problem," Andrea and Doreen chorused – I refused to rise to the challenge. Enough for now,

Cheers,

Bob

PS. Doreen says that her school has just taken on a dwarf to teach IT – apparently it's a shortage subject.

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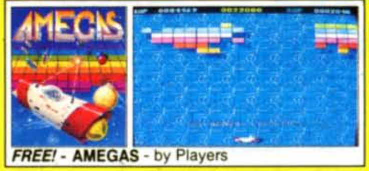

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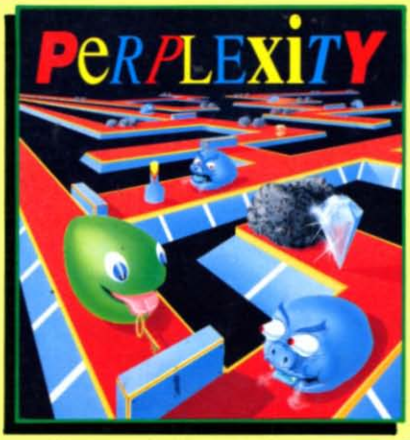

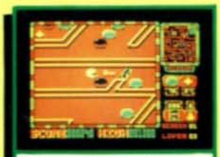
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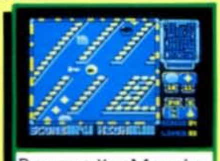
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3-Dimensional Strategy Game with Brilliant Graphics

PERPLEXITY consists of 16 increasingly difficult levels, each a puzzling maze with one of four different 3D background themes. Collect the diamonds by pushing together the boulders scattered about the maze and push the keys to the correct doors to open them.

But watch out for the monsters who will chase you around the maze. And watch out also for the 'mystery boulders', which may give you a bonus score or a magic potion, but may also reverse some or all of the movement controls...then you've really got problems!

On-screen information includes a constantly up-dating scanner/map, which allows you to plan your route, a score-line and timer/status icons. Passwords allow you to skip completed levels.

PERPLEXITY combines the best puzzling features of REPTON games with superb 3D graphics, to give a highly addictive and visually brilliant game. Are you ready to face the challenge?

(The Electron version has the same graphics as the BBC Micro version.)

PLAY IT AGAIN SAM 13
A New Top-Hit Four-Game Compilation

BARBARIAN II

Have you the skill and strategy to reach the Dungeon of Drax? Twenty gruesome monsters to defeat in an 80 screen maze.

"The monsters are spectacular in size and design. A most impressive and playable game"....Acorn User

PERCY PENGUIN

The classic and highly addictive game by Superior. Percy must kill the Snobees in the frozen maze by hurling ice cubes at them, but deadlier breeds then appear!

"Enjoyable to play with good graphics and sound"....A & B Computing

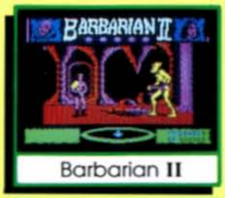
HYPERBALL

A brand-new release by Superior. The best version ever of the classic 'bat-and-ball' game, with 6 levels and a massive total of 120 screens. Special features include: infra-red scanners, 8-ball splitters, aliens, cannons, weapons' purchase, bonus rounds and screen-jump options.

PANDEMONIUM

A brilliant 'Top Ten' game by Peter Scott, featuring teleporters, lifts, springs, weird aliens to shoot, and lots, lots more, as you attempt to construct the core.

"Eighty screens of fun make this game my favourite"....Micro User



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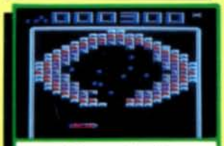
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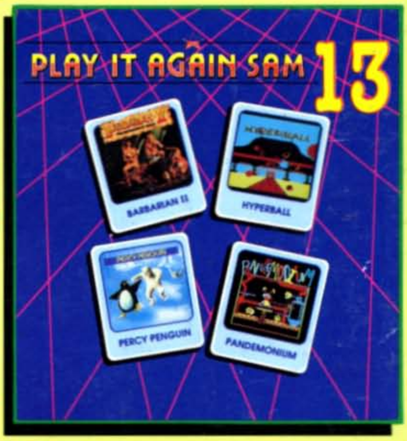
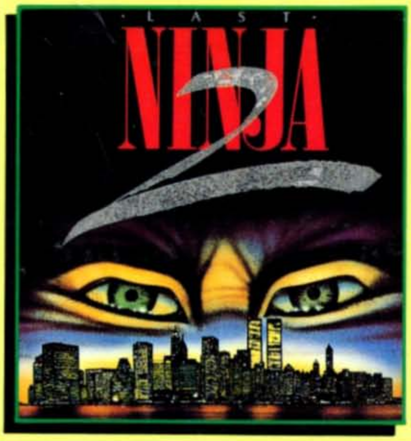
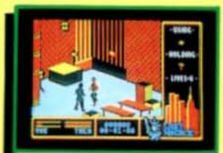
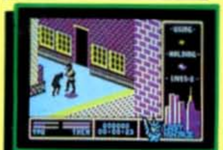





A Thug in the Cellar


Mugged on the Street

LAST NINJA 2 - Back with a Vengeance!

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DATELINE: 1990 **THE PLACE:** Downtown New York
THE QUEST: To destroy the eternal evil........Kunitoki!

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(The screen pictures show the BBC Micro versions of the games.)

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